THE IRON AGE

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Making Aluminum Automobile Bodies

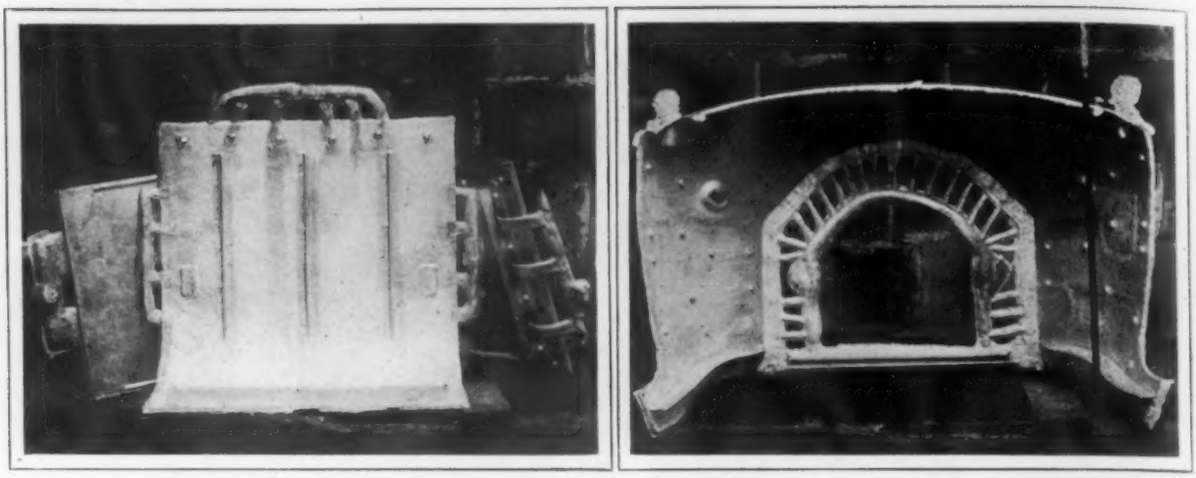
The Foundry Practice Developed at the Buffalo Plant of the Aluminum Castings Company for Producing Large Castings of Very Thin Sections

The building of an automobile body from aluminum castings ten years ago was hardly practicable, for at that time methods employed in aluminum foundries and the knowledge of mixing suitable alloys to get the best results did not warrant attempts to make an aluminum casting light enough to compete with bodies constructed of wood and sheet metal. Even a comparatively few years ago 3/16 in. was regarded as about the minimum thickness for aluminum castings of large area. Since then refinement in methods has made it possible to decrease the section of such castings considerably further, and the large sections of aluminum castings now in use in making the touring and inclosed bodies of the Pierce-Arrow motor cars are but ⅛ in. in thickness throughout the greater part of their surfaces.

These castings are made at the Elmwood plant of the Aluminum Castings Company in Buffalo, N. Y., and some interesting foundry practices have been developed in making them. For some years past cast aluminum has been used by a number of manufacturers for dashes, but the Pierce-Arrow Motor Car Company, almost from the time it started to build touring cars, has used cast aluminum throughout for its car bodies.

The advantages claimed for aluminum construction are that the aluminum bodies are lighter than those made of sheet metal and have a rigid surface that will not dent as easily in handling; also that they provide an increased factor of safety in case of accident, as a cast aluminum body will not crush as easily as a sheet metal body. In addition to this, other advantages claimed are that the cast aluminum offers a surface which retains paint better than sheet metal and the rigidity of the body makes it much more durable, as even after many years' use it does not twist

The Upper Photograph Shows an Aluminum Casting 4 Ft. 6 In. by 5 Ft. 6 In. by ⅛ In. Thick for the Top of a Coupe. Another Photograph Shows How an Aluminum Casting for Automobile Body Is Poured with Four Ladles at Once. The Third Photograph Is a Reproduction of the Method of Skin-Drying a Mold with an Oil Torch After the Pattern Is Drawn



Two Illustrations of the Methods of Gating Aluminum Automobile Castings. In the Photograph to the Left a Door Is Shown on the Left Poured with One Sprue Having Two Large Gates and Poured at an Angle of 30 Degrees. The Casting in the Center of the Same Picture Is a Side Body Casting, Poured with Three Sprues and 14 Gates, All Sprues Being Poured at Once. Another Method of Gating Is Shown in the Third Casting in the Same Photograph, that from Underneath, it Being Poured with One Sprue and Three Gates. The Illustration on the Right Shows a Very Difficult Casting to Pour and a Fine Sample of Gating. It Has 4 Sprues and 26 Gates and Is Poured Flat with the Curve Extending Downwards.

and give, causing disagreeable squeak and failure of the different parts to maintain their joints.

The ability to produce thin aluminum castings is due to long experience in this special line of work, combining refinement of foundry practice with the knowledge of suitable alloys so that a casting can be secured which has the necessary strength and physical properties. The size of some of these castings is indicated by the fact that one used for the top of a coupe body is approximately 5 ft. 6 in. by 4 ft. 6 in. and only about ⅛ in. in thickness. One of these castings is shown in one of the illustrations, the fracture on the right side showing the thinness of the metal. Specifications require that the variation in weight must not exceed 10 per cent. of the weight of the aluminum pattern. That means very close molding, as the casting must be kept within one one-hundredth of an inch of the thickness of the pattern. This one one-hundredth of an inch must include all variations due to rapping and champing the flask and pouring. Great care is required in pouring, as this affects the weight. If the molds are poured fast, the metal is denser than if poured slowly. The castings must be free from even the most minute cracks and pin holes and they are closely inspected for imperfections.

MOLDING PRACTICE UNUSUALLY DIFFICULT

While the theory of molding the aluminum body castings is simple, the practice is unusually difficult, but in spite of this the losses due to imperfect castings are quite small. Molds are all rammed by hand on the floor, the surfaces being skin-dried with an oil torch after the pattern is drawn so that the metal will run properly and the casting will have smooth surface. The larger castings weigh from 25 to 30 lb. The molds are poured with four or five ladles at the same time in order to make sure that the metal will run over the entire surface. One of the photographs shows a pouring operation and another shows a mold being skin-dried. Because of the size of the section it is necessary to use 2 cu. yd. of sand for the molds of some of the 25-lb. castings. Very heavy wooden flasks are used with plaster of paris match with wooden ribs. The flask is shaken out from two to five minutes after the casting is poured to allow for shrinking and to prevent cracking. A great deal of attention to the proper setting of chills is required, the chills being of the greatest importance in getting good castings. Chills are required to prevent cracking in the thicker parts of the metal. In making some cast-

A View of a Mold of a Large Aluminum Automobile Casting Revealing the Great Number of Chills That Are Set to Prevent Cracking

A Photograph of the Practice of Hammering Sections of Aluminum Castings for Automobile Bodies to Fit Wooden Molds in the Pierce-Arrow Plant

ings, as many as 200 chills are used. A striking illustration of this is shown in a photograph.

VARIOUS METHODS OF GATING

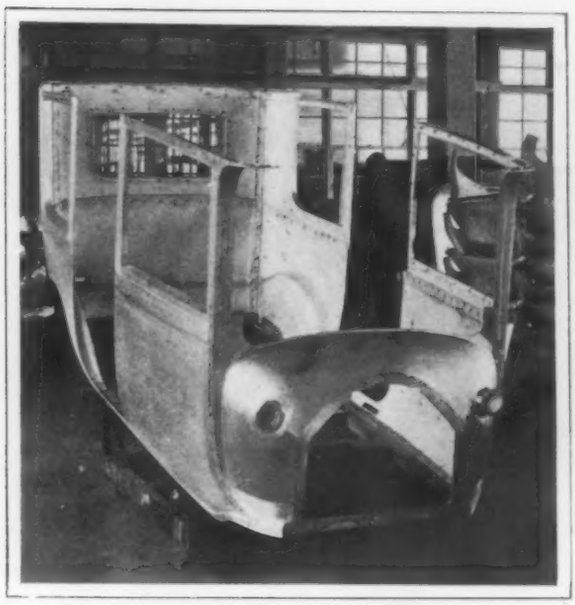
Molds for castings with curved surfaces are poured flat. In case the casting is a flat piece such as a limousine door, the flask is tipped to an angle of 30 deg., so that the metal will run. A mold for a casting with an entirely flat surface is poured from a sprue hole and two gates. For pouring molds for a curved casting two to four or five sprue holes are provided, each with four to six gates. One of the illustrations shows the method of gating to obtain the proper flow of metal. The door shown on the left of this illustration is poured with one sprue with two large gates, this mold being poured at an angle of 30 deg. In the center is a side body casting that is poured with three sprues and fourteen gates, all the sprues being poured at once. Another method of gating is from underneath, as shown in the window-frame casting on the extreme right, this being poured with one sprue and three gates. A very difficult casting to pour and a fine example of gating is shown in the illustration of a dash that is poured flat with the curve extending downward. This mold has four sprues and twenty-six gates, no raisers being used except the sprues themselves. After the castings are taken from the molds they are cleaned and the fins are chipped off, and then they are ready for shipment to the automobile plant.

CARE NECESSARY IN FINISHING CASTINGS

Great care is required in finishing the castings at the Pierce-Arrow plant before the sections are assembled into car bodies. Owing to the thinness of the metal many of the castings are warped, but the metal is sufficiently pliable to permit straightening. Some of these are hammered into shape by means of a wooden mallet or rawhide hammer, but parts with considerable curved surface are clamped on wooden molds of the shape of the piece and straightened with a steel hammer and wood block, as shown in one of the illustrations. After being straightened the castings are hand finished by filing and drawing, and polished with an emery cloth as shown in another photograph. After finishing, the castings are drilled and the parts are assembled by cold riveting to form the body. There being no wooden frame work, the strength of the body is therefore, entirely dependent on the aluminum castings.

The only wood used in the construction is the sills for the doors and windows, partitions, floor and the driver's seat. The joints are all at the lines of the body, and these are cast with ribs, so that

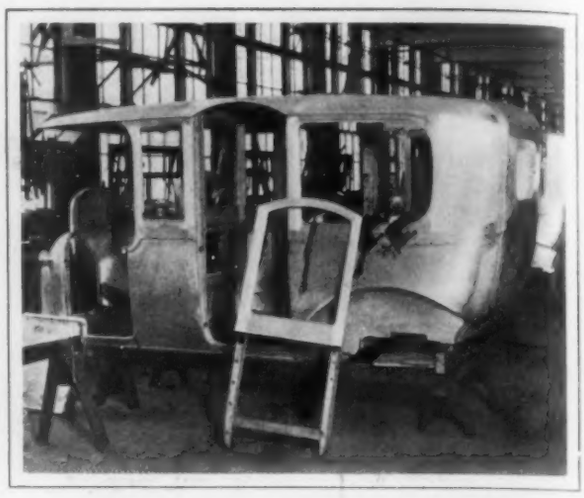
A View of the Method of Hand-Finishing the Aluminum Sections by Filing and Drawing and Polishing with an Emery Cloth in the Pierce-Arrow Plant



The Method of Assembling the Sections to Form a Body and Showing How They Are United

when the body is assembled, it has the appearance of one piece, the body being so designed that none of the joints is left open. One of the photographs shows how the body is built by sections and how the castings are assembled and fastened together by riveting, while another illustration shows the body nearly finished.

Recently the strength of the aluminum body was put to a severe test, when a limousine that, in attempting to escape a grade crossing accident, was swerved around to the side of the railroad track. The rear end of the car was hit by the tender of a fast train and was badly wrecked on one side and the car was rolled down an embankment. The body back of the hood was damaged very slightly, the glass in the tonneau was not broken, and the occupants, consisting of three women and chauffeur, were uninjured.



An Aluminum Body Nearly Finished Showing the Little Woodwork Used in Its Construction

Mining Field Meet at San Francisco

The third annual joint field meet of the United States Bureau of Mines, the American Mine Safety Association and the California Metal Producers' Association will be held at the Panama-Pacific Exposition, September 23 and 24. It is expected that there will be a large attendance of mining men, as the joint meet will either precede or follow the annual meetings of a number of institutions allied to the mining interests. On the athletic field of the exposition there will be a mine-rescue demonstration, a first-aid demonstration, a demonstration of the explosibility of coal dust, a first-aid contest for interstate supremacy, a rescue contest for interstate supremacy and a rock-drilling contest.

A departure from the ordinary selling plan for oxy-acetylene welding and cutting equipment was recently made by the Imperial Brass Mfg. Company, Chicago, Ill. Two of its engineers have started on an automobile trip which will cover the entire country. A welding and cutting equipment is carried, together with supplies, and practical demonstrations of the plant will be made in various garages and manufacturing plants in the different cities along the route.

A View of One Floor of the Body Department of the Pierce-Arrow Plant

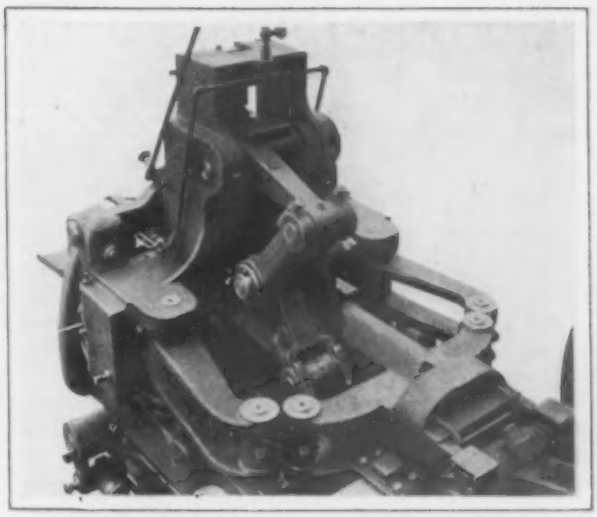
New Hammer Bolt Heading Machine

The National Machinery Company, Tiffin, Ohio, has brought out a hammer bolt heading machine. This machine, which is known as the continuous-motion semi-automatic type, is designed for making square, hexagon and T-head bolts from heated stock. The sole object sought in the design of this new machine was to effect the gripping, starting and stopping movements automatically and thus free the operator so that he could devote his attention to feeding the machine. In addition to accomplishing these movements automatically by mechanical means, the main shaft and the heading and hammer slides run continuously, and it is also possible to set or time the machine to deliver a predetermined number of blows in making any particular kind of bolt. Another departure in the design is the use of a lever construction for carrying the lower hammer. Front, three-quarter and rear views of the machine, which show it equipped with a shear for cutting the bolts off the rod and also serve to give some idea of the proportions of the working parts, are shown together with one of the bronze bushed links which are employed to operate the hammer levers.

The main shaft and heading and hammer slides of the machine run continuously, the same as in a rivet-heading machine, with the result, it is pointed out, that the output is increased. Another advantage of this arrangement is that the starting and stopping clutch on the main shaft is eliminated together with the troubles from wear and clutch repair. It is also possible to regulate the time that the grips are open for feeding, as well as the number of blows to be delivered in forming the bolt head, these changes being effected through a simple gear and cam construction.

The bed of the machine is of the heavy box type reinforced by ribbing. The other parts of the machine have been made correspondingly heavier, with the result that the 1-in. machine weighs approximately 13,000 lb. The speed of the machine is 140 r.p.m. when handling 1-in. stock, and it is possible to increase this rate if smaller work is being handled.

A cut-off attachment is introduced in the gripping which is relied upon to enable short bolts to be made directly from the rod. It is claimed that four to six bolts can be made in one heat in this machine, depending to some extent, of course, upon the diameter and length of the bolts made. The lever construction for carrying the lower hammer is a departure from the builder's previous design, in which it was carried in a slide similar to that provided for the side and top hammers. This arrangement, it is explained, was unsatisfactory, as the scale dropping from the bolts during the forging operation fell on the slide, and coupled with the action of the water, caused considerable wear. The side and top hammer slides in the new machine are operated by bronze bushed links in place of cams and rolls. The slides in the machine have been made extra long. The shaft bearings, which are bronze bushed, are of large diameter. Special provision has been made for lubrication and the bearings of the main shaft are self-oiling. The others have a large oil pocket or readily accessible cup oiler, and the oil pocket and oil holes have sliding or hinged covers to guard against the entrance of scale, dust or any foreign substance that would induce friction.



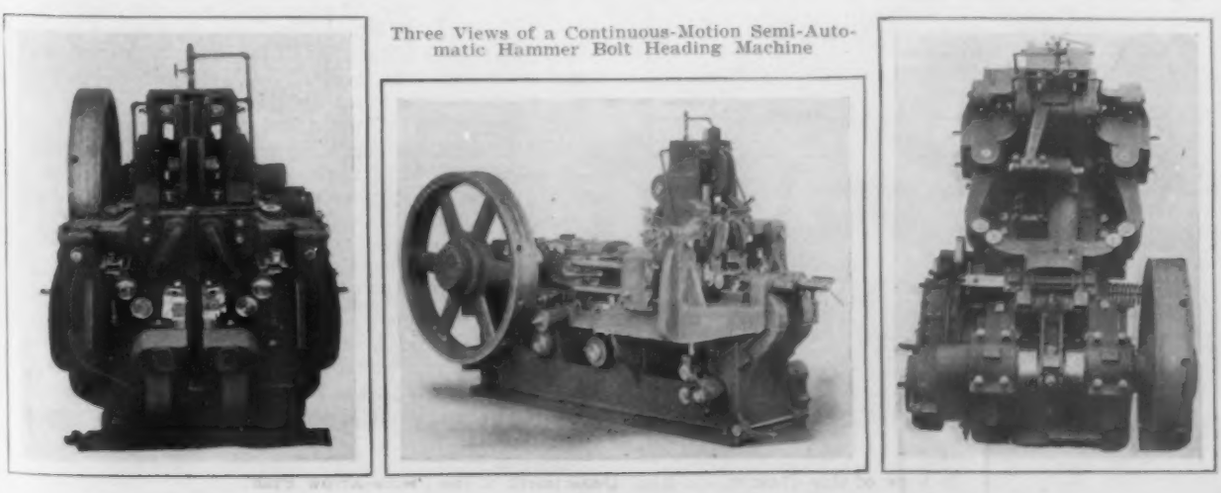
The Bronze Bushed Links Which Are Employed to Operate the Hammer Levers in Place of Cams and Rollers

The flywheel is of the builder's friction-slip construction. This is relied upon to act as an automatic safety device in case cold stock or an excessive amount of metal is gripped in the dies and obstructs the travel of the heading tool. It also serves as a protection for the motor when the direct-connected type of electric motor drive is used.

Three sizes of machine are built, having capacities of ¾, 1 and 1½ in., respectively. Either belt or motor drive can be employed.

The 1915 convention of the American Boiler Manufacturers' Association will be held at the Lawrence Hotel, Erie, Pa., June 21 to 23. Among other matters the convention will consider a uniform cost system and the standardization of material, workmanship and terms of payment clauses in specifications and means of securing the adoption of the A. S. M. E. boiler code by the several States.

Three Views of a Continuous-Motion Semi-Automatic Hammer Bolt Heading Machine



A Four-Part Factory Inventory System

Division of Plant into Numerous Small Groups for Speed—Use Made of Preliminary Instruction Cards—Goods in Process Included

BY H. A. RUSSELL

The inital cost of taking the yearly inventory may to a great extent be offset if proper use is made of the information secured. Also, while the inventory in itself is not a new thing, there have of recent years been improvements in the methods of taking it. In this article will be considered four distinct groups: Materials, Goods in Process, Finished Product and Supplies. Three of these items are comparatively easy to value, but the second item, Goods in Process, materials finished or partly finished and which have not as yet become parts of the finished machine, has been the uncertain factor in a great many factory inventories. Before going further it might be well to state that only the four items mentioned above will be considered at this time.

The methods which will be described have been used within the last few months and have given the most satisfactory results. There were almost 40,000 items recorded, the total value running up into the hundreds of thousands of dollars, and the actual recording time was slightly under 50 hours working time for each of the several groups of men employed.

The factory in which this system was used covers quite a few acres of ground surface, some of the buildings having four floors. The manufactured lines are varied, no department in itself completes any one machine, the parts required to complete a large percentage of the output are drawn from all departments and the finished product varies in weight from 100 lb. up to that many tons. Units of what will later be completed machines are constantly progressing from one department to the next. Many similar items were found in different departments, some in the rough, some partly finished and others finished. Again these parts were found attached to other parts and these units were treated as groups. A more or less complete inventory had always been taken, but this year it was decided to arrive at a more accurate result, one reason being to check up all existing Production Department records and to increase their number, and another reason being to weed out such parts as had accumulated from time to time owing to changes in design, etc.

Several months before the inventory was to be taken complete instructions were sent to each department foreman and assistant foreman and to each one of the office men who was later to be in charge of a group of counters, checkers, etc. Several weeks before the inventory date a meeting was held which was attended by all those who had received a copy of the instructions. Questions were asked and some points that seemed to conflict were made clear or changed. Everybody was made to feel that their heartiest co-operation was desired and needed.

To cover the whole factory simultaneously, there were 15 groups. In some departments two or more groups were necessary, again a group would finish one department and then proceed to the next. The writer visited each group every hour, answering questions, simplifying the work where necessary and seeing that everybody was kept in supplies and endeavoring to have the reports in such shape that the Cost Department would have a minimum amount of work to do later on.

While there were only 15 groups, there were actually over 50 men employed in counting, checking and writing up the reports. Some groups consisted of two men, others had as high as seven. The counters and weighers went first, the checkers and writers following from one to two hours later.

The general instructions sent to the different heads of departments were as follows:

INVENTORY METHODS AND INSTRUCTIONS

We will have the following nine divisions to consider in taking the inventory: 1—Materials in stockrooms: these will be inventoried from the stockroom cards. 2—Supplies in stockrooms: these will be inventoried from the stockroom cards. 3—Materials outside of stockrooms. 4—Supplies outside of stockrooms. 5—Goods in process of manufacture. 6—Inventory of finished product. 7—Repair parts in repair stockroom. 8—Lumber outside of factory. 9—Lumber in factory which may be material or goods in process, as the case may be.

We will first consider Materials and Supplies in Stockrooms. Stockrooms will report as heretofore—that is, the office will make up the inventory for stockrooms from the record cards. These cards must be complete and up-to-the-minute, so that a list of all the items and quantities can be made. These cards should be in such shape that they can be called for if necessary on or about December 20. See also separate memorandum to stockroom keepers.

Materials outside of Stockrooms, and which are not

DEPARTMENTAL INVENTORY REPORT 14153

Dept. No. #1
Description #3
Class No. #2
Quantity #4 Size #5 Pat. No. #6
Material and Grade #7 Rg. Wt. 1 Pc. #8 Total Wt. #9
Place check mark ( ) in proper Division (Finished #10 Partly Finished #11 Rough #12
If partly Finished specify last operation #13
Labor 1 piece #14 Total Labor Cost #15
Material Rate #16 Total Material Cost #17
Remarks: #18
Jan. 1, 1915 O. K. #19
Report two or more attached parts as groups, on reverse side, in detail.

GROUPS—TWO OR MORE PIECES ATTACHED

Quan.	Sym. No.	Name of Part	Sizes	Material	Wt. 1 Piece	Matl. Cost	Labor

Total Part Labor and Matl. Cost Assembling Total

Departmental Inventory Report. The Face or Upper Portion Is Used for Parts Composed of One Piece Only While the Reverse Side Below Is for Groups of Two or More Attached Pieces

included in the Inventory of Finished Product, and which are not Goods in Process, and which are not Manufacturing Expense Items, or in plainer language articles which will later be units or parts of machines, but upon which no productive labor has been applied. Please note that trucking and handling are not productive labor.

Supplies outside of Stockrooms, namely, those articles which have been requisitioned from the stockroom or from the toolroom for use in the manufacture of our product, but which are not a part of the product, such as files, chisels, punches, dies, planer and lathe tools, twist drills, etc.

Goods in Process of Manufacture, or materials on which productive labor has been applied, and which are units or parts of our product. The value of similar items of goods in process will vary considerably; for instance, a certain casting may have only the first machine operation finished; a similar casting may have several more operations, or it may be entirely machined. The inventory value will vary accordingly. Where several parts are grouped together there will be added to the labor cost on each piece the cost of the labor of assembling the group.

Inventory of Finished Product. This will be attended to by the production department, as heretofore. Great care must be exercised that the items which the production department includes in this report are not duplicated on any other reports. For instance, the production department reports 1000 No. 100 plows. These plows are not assembled, and various parts are stored in a number of departments, handles in one or more places, beams in one or more places, and castings and steel parts in still other parts of the factory. The same remarks would also apply to S plows and to boilers, the boilers might be complete, excepting that the ash pans and stack bases might not be attached.

Repair Parts in Repair Stockroom which will be reported by Mr. ———, giving description, classification and quantity in each instance.

All Lumber—that is, boards, planks or dimension stock, outside of the factory, and which is in the various lumber storage yards, will be reported by lumber department.

Lumber in the Factory. This will be reported principally in the carpenter shop inventory, although there will be certain items found in other departments. Where no productive labor has been applied the lumber will be reported as material, placing a check mark behind the word "Rough" on the inventory slips, but where productive labor has been applied this will be noted on the inventory slips, placing a check mark behind the words "Partly Finished" or "Finished," as the case may be; also specifying the last operation.

METHOD OF ASCERTAINING WEIGHTS

Gray-Iron Castings.—Production department will give these from their casting record cards.

Malleable Castings and Steel Castings.—Purchase department will give these from their records.

Bar Steel and Spring Steel and Plow Steel.—Weights will be calculated by purchase department.

I-Beams, Channels, Angles and Tee Weights will be calculated by purchase department.

Boiler Plate, Tank Plate, Black and Galvanized Sheet Weights will be calculated by purchase department.

Brass, Box Metal, Castings and Hydraulic Metal Casting Weights will be given by production department.

We will next consider the instructions which were sent to specific departments.

DEPARTMENTAL INVENTORY INSTRUCTIONS

Foundry

You will report actual count or weight of the following articles: Box or hydraulic or connecting rod metal—Weight of each grade. Scrap brass—Weight. Scrap copper, including wire—Weight. Scrap lead—Weight. Scrap zinc—Weight. Aluminum—Weight. Facing—Weight. Bituminous facing—Estimate weight

DEPARTMENTAL INVENTORY REPORT
Goods-In-Process

14102

Dept. No. 6

Description Pulley Class No. 1

Quantity 10 Size 4¾"x5⅝"x2" Bore Pat. No.

Material and Grade S. I. Rq. Wt. 1 Pc. 9⅛" Total Wt. 91¼

Place check mark in proper Division: Finished ✓ Partly Finished Rough

If partly Finished specify last operation

Labor 1 piece 17½¢ Total Labor Cost $1.75

Material Rate 2½¢ Total Material Cost $2.27

Remarks:

Jan. 1, 1915 O. K. [illegible]

Report two or more attached parts as groups, on reverse side, in detail.

GROUPS—TWO OR MORE PIECES ATTACHED

Quan.	Sym. No.	Name of Part	Sizes	Material	Wt. 1 Piece	Mat. Cost	Labor
4	2B 194	Web Ring	For 24" Pulley	S.I.	45"		
4	2B 193	Arm "	" " "	"	42	$1.54	.72
4		Boiler Plate	½"x15" Oval				
4		" "	½"x2½" Inside				

Total Part Labor and Matl. Cost $1.26 Assembling 25¢ Total $1.51

Slip for Goods in Process

(the last carload weighed 36,000 lb.). Core wash—Weight. Core oil—Estimate quantity in gallons. Core compound—Quantity of bags. Charcoal—Quantity of bags. Coke—Estimate quantity (a carload averages 55,000 lb.). Pig iron—Count actual number of pigs, reporting Mayari and Allegheny iron separately. Scrap iron—Estimate weight. Sieves, brushes, anchors, baskets and shovels—Quantities and sizes. Sand and gravel—Estimate weights (an average carload weighs 70,000 lb.). All gray-iron, brass or bronze castings by classification—Weight.

Departments 6, 8, 10, 11, 12, 13 *and* 14

The actual taking of the inventory in these departments will be in charge of one or more of the office force in each department, assisted by assistant foremen and others.

The inventory slips must be used for all reports from the above departments.

The inventory slips must be used according to the consecutive numbers. For instance, if we were to start at the lower end of engine department with slip No. 1 we would continue to use the next higher numbers, so that when the slips are to be gathered the collector can start at No. 1 and continue consecutively, thus overcoming any chance of some of the slips not being gathered. *Do not destroy any of the slips. All slips must be accounted for at the wind-up.* If you spoil a slip simply write the word "Out" on the face of the slip and put it with the next consecutive number.

Remember that you cannot report more than one item on a slip. A single item may consist of the following: A material part, on which no productive labor has been applied, a goods-in-process part on which some productive labor has been applied, a finished part, a group of goods-in-process parts on which productive labor has been applied, a group of finished parts, a manufacturing expense item, a supply item, or a jig.

Remember that a goods-in-process item on which the first operation has been done is a distinct and separate item from a similar part which has had more operations applied to it.

In filling in inventory slips you will record the following information: 1—Number of department, in which you are working at the time. 2—Number of classification of part you are reporting. 3—Description—Name of part. 4—Quantity, that is, the number

of pieces by actual count. 5—Size. This will include width, thickness and length, if for a flat piece, or diameter or square and length of round or square piece. 6—Pattern number. This includes the designating letters if any. 7—Material and grade—If steel, report whether soft or hard. If lumber, a report whether pine, oak, poplar, hemlock, etc. If a casting, report whether gray iron, malleable, steel, brass, bronze, aluminum or babbitt metal. 8—Rough weight of one piece. See memorandum on weights. 9—Total weights—These will be calculated by office. 10—Finished. 11—Partly finished, and 12—Rough. These three refer to labor only, and you will place check mark behind proper division as a guide for cost department. 13—If partly finished specify last operation. It is essential that the last operation be specifically mentioned, so that the cost department will be able to apply the proper amount of labor cost and overhead expense. 14—Labor one piece; 15—Total labor cost; 16—Material rate, and 17—Total material cost. Cost department will fill in these four blanks. 18—Remarks. Write in here any remarks that may help cost department later. 19—OK, to be signed by party in actual charge of inventory.

Reverse Side of Inventory Slip—Wherever two or more pieces are grouped, the report will be filled in on this side. On the numbered side of the slip you will fill in items 1-7, inclusive; 10, 11 or 12; 13, 18 and 19. On the reverse or group side of slip you will fill in quantity; symbol number (pattern number and letter); name of individual part; size of each part; if steel, wood, etc. (not castings), kind of material. The remaining vertical columns, as well as the bottom line, will be filled in by cost department.

If it should occur that a group of parts cannot be listed on one slip, use additional slips of consecutive numbers and fasten these slips together with paper fasteners.

Be explicit. It is far easier for you to put the correct information on the slips than for someone else to try to do so later.

All slips must be left with the items they refer to, to be fastened either with a string or weight, and be left in plain view, and must not be disturbed until the collector gathers them up. The only way that the office can be certain that all slips are returned is to check up the consecutive numbers, as the slips are collected.

Instructions to Stockroom Keepers

The stockroom inventories will be divided into materials in stockroom and supplies in stockroom.

Stockrooms will report as heretofore—that is, the office will make up the inventory for the stockroom from the record cards. These cards must be complete and up to the minute, so that a typewritten list of all the articles and quantities can be made.

There are some few articles which are not carried on the record cards and the stockroom keeper will report these on separate sheets of paper, which will be sent to them at the time we are ready to go ahead with the inventory. These papers will be headed in type-

JANUARY 1ST, 1915 — INVENTORY RECORD — SHEET NO. 12 — CLASS NO. 7 — DEPT. NO. 11

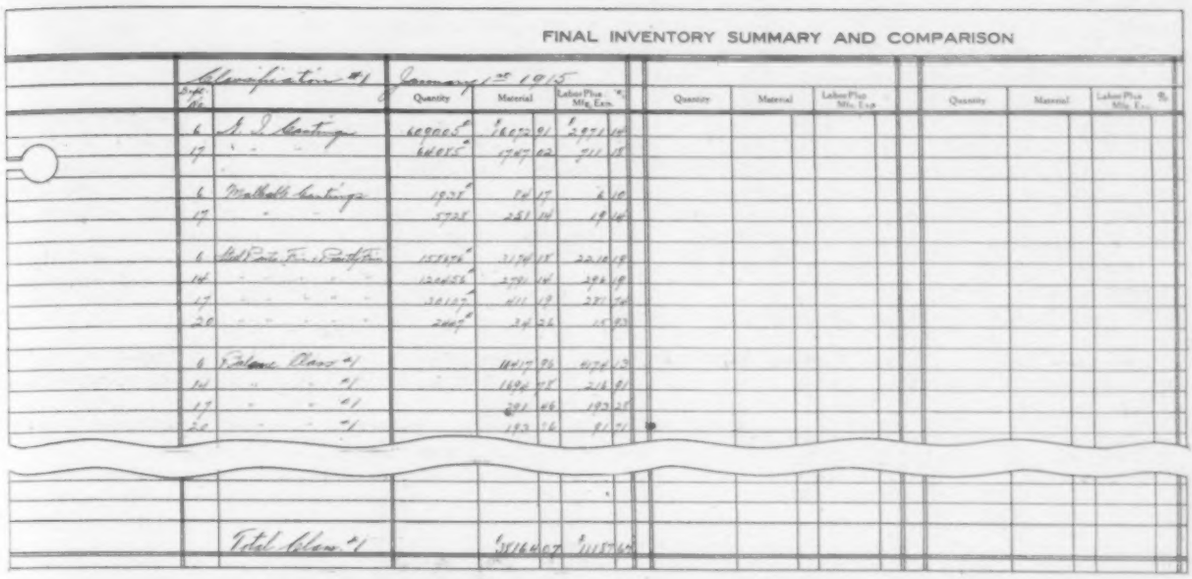
Quantity	Sym. No.	Description	Size	Material and Grade	Wt. 1 Piece	Total Weight	Rate and Unit	Total Material Cost	Total Labor Piece	Total Material Labor and Expense
1	578	Pulley		C.I.		18#	3¢/lb.	54	22	
3	"	"		"	15#	54#	"	1 62	66	
9	544	"		"	24#	220#	2¾¢.	6 44	72	
26	5502	"		"	55#	1430#	2¾¢.	39 33	28 08	
39	519	Cone		"	7#	273#	3¼¢.	8 87	4 20	
132	493	Flange W'hel		"	2#	264#	3½¢.	9 24	4 84	
1	2267	Crank		Malleable		44#	5¢.	2 20	1 12	
4	97	Bearing		Brass	9#	24#	20¢.	4 80	— —	
11	535	Blade		C.I.	14#	154#	3¢.	4 62	66	
18	571	Mandrel	1¾"×3½"×8 3/4"	Steel		143#	1 35/lb.	1 93	1 32	
10	574	Front Plate	1¾"×3½"×23"	"		76#	1 60¢.	1 21	32	
201	2126	Arm		Malleable	1¾#	361#	4½¢.	16 24	5 24	
6	17	Rear Shell		C.I.	24#	144#	3½¢.	49	18	
22	6148	Dust Chute		"	1#	23#	4¾¢.	1 10	52	
16	1415	Screw					23/lb.	14 72	1 52	
23	5417	Head Spring	¾"×¾"×14½"	Spr. Steel		12#	2¾¢/lb.	25	69	
4	5111	Shafts	¾" D×42½"	C.R. Steel		63#	180¢.	77	96	
6	5119	"	" " ×26½"	" " "		37#	"	67	96	
58	1127 1128	Rear Shell & Bracket		C.I.		26#	3½¢.	70	33	
17	5104	Pipe & Flange	1" × 31¾"	W.I. Std. Pipe				5 40	74	
42	714	Hanger		Malleable	13½#	76#	4½¢.	3 15	2 52	
26	15	Rod		"	3½#	120#	"	5 40	2 16	
17	94	Pulley		C.I.	3½#	166#	3½¢.	2 10	1 76	
16	192	Thrust Plate		"	15#	5#	7¢.	35	05	
1	115	Idler		Malleable		5#	4½¢.	02	02	
72	1187	Eccentric		C.I.	1#	72#	4½¢.	3 42	1 22	
74	1191	Plate		"	2#	148#	3½¢.	5 18	1 48	
1	567	Box		"	4#	4#	"	14	06	
16	1192	Plate		"	10#	166#	3¢.	4 98	1 60	
							Totals	146 20	68 57	

The Sheet on Which the Information from the Slips Is Collected

writing, with the stockroom number and department name.

There are certain items, principally material, which are recorded on the stockroom cards, but which are not kept in the stockroom because of lack of space. Care must be exercised so that these various items are not duplicated, for instance, governors for engines which are stored along the gangway outside the engine department stockroom, waste which is stored at the same location, malleable chain, washers, bolts, etc., on the third floor of upper machine shop, and which are recorded on the stockroom cards. These items should be tagged with shipping tags, so that there can be no chance of the items being taken into account more than once. Write on these tags "This item is included in stockroom inventory"; also write the date and sign your name.

There are probably certain items in the stockroom which are really goods in process; these, however, will be detected and sorted out when the office makes up the report for the stockrooms.



The Final Summary Sheet Which Gives Comparative Figures for Several Years

Pattern Department

You will report the following articles by actual weight, count or measurement: Wood screws—Quantity, all kinds lumped. Brads—Weight, all kinds lumped. Shellac—Weight. Leather fillet—Quantities and sizes. Pattern letters—Total quantity each size and style. Pattern numbers—Total quantity each style and size. Calcine plaster—Weight. Pattern lumber—Thicknesses, kinds, quantities in square feet 1 in. thick. Denatured alcohol.

Sheet Iron Shop

You will report actual weight or count of the following articles: Black sheets—Quantities, sizes and gauges. Galvanized sheets—Quantities, sizes and gauges. Aluminum coated sheets—Quantities, sizes and gauges. Planished jacket iron—Quantities, sizes and gauges. Soft rivets — Weight and sizes. Tinned rivets—Weight. Spark arrester wire netting—Weight of roll. Malleable castings—Quantities, symbol, number and weight of one piece. Steel castings—Quantities, symbol, number and weight of one piece. Tin—Number of sheets, size and grade. Steel parts—Quantities, sizes, classification and name. Solder—Weight. Ash pans—Size of rig, quantities and classification. Spark arresters—Size of rig, quantities and classification. Stacks—Size of rig and length, quantities and classification. Stack joints—Diameter, length of joint, gauge of steel and quantities. Stack bases—Size of stack and quantities. All sheets on which labor has been expended. All steel parts on which labor has been expended. Size, length and quantity of gutter and down spouting, elbows and circles.

Smith Shop

In reporting the inventory for this department you will, of course, be governed by the memorandum "Proposed Inventory Methods and Instructions," and you will also be guided by the following instructions:

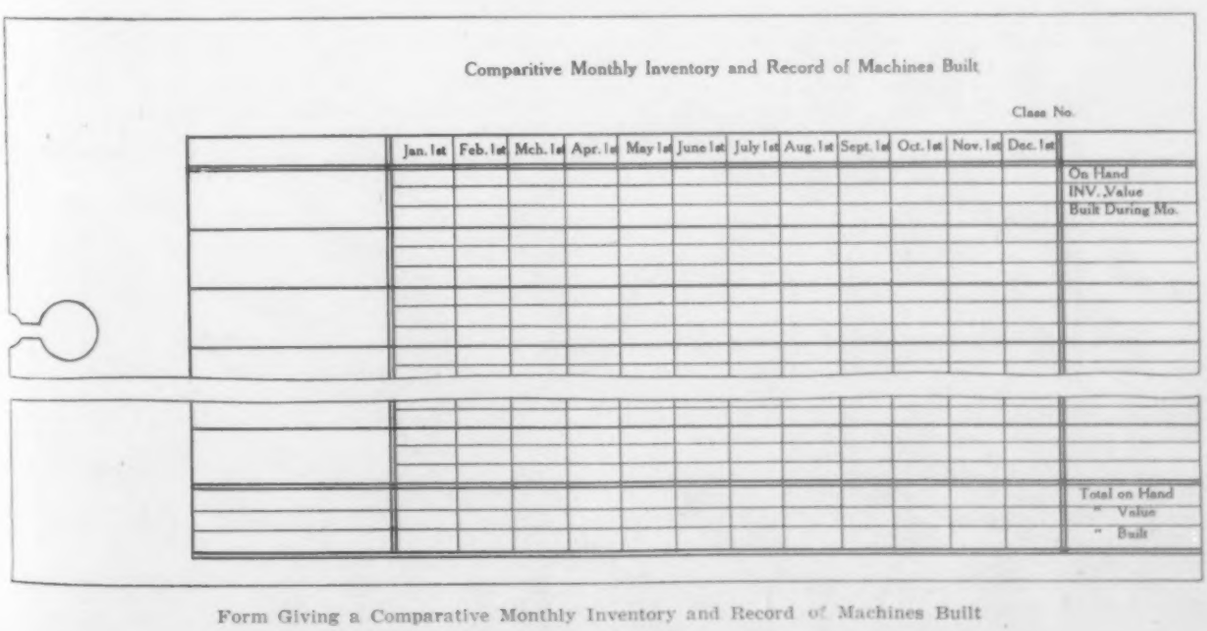
Steel bars in random lengths will be reported, as so many bars of whatever the size, or if it is a flat piece, sizes will be given, also the average length in feet, and also the grade. Under the word "Grade" we will include dead soft, soft, hard and spring steels.

Steel bars in cut lengths same as above, except that the actual length of the piece will be given. The variation of ½ in. makes no appreciable difference.

Plow steel to be reported the same as bar steel, except the change in grade, namely, plow steel and soft center plow steel.

Steel shapes, such as harrow I-beams, will be reported by description and all dimensions, including lengths. For instance, the dimensions of the harrow I-beams are 2 1/16 x ¾ x 0.172 in. x length.

Note: If there are any bars or pieces of iron on hand these are to be reported with the corresponding sizes of soft steel.



Form Giving a Comparative Monthly Inventory and Record of Machines Built

Gray-iron castings, quantity, symbol and number, classification.

Malleables, quantity, symbol and number, classification.

Bolts, quantity of each size and length, specifying the style of head.

Washers, size of bolt on which washer will be used, total weight each size.

Sawmill track, light or heavy, number of pieces, each weight and each length not punched: number of pieces and each weight and each length punched.

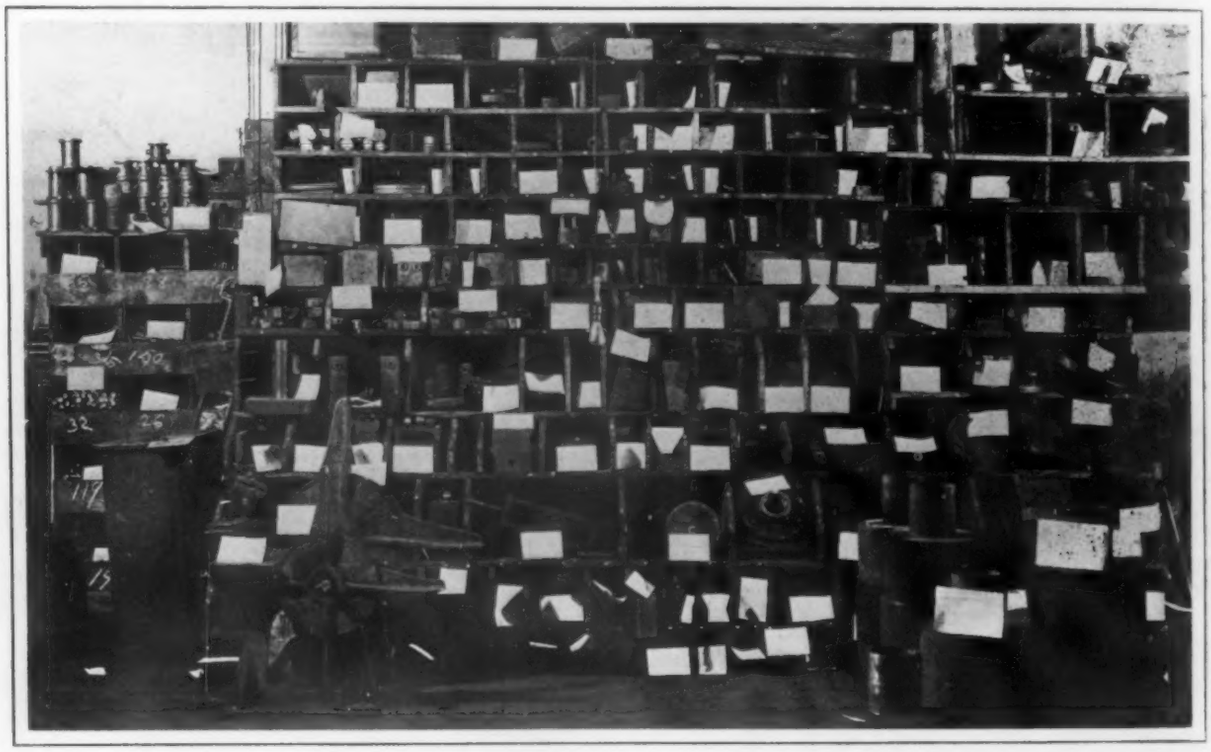
Clevis rings and ovals, size of ring or oval, diameter of material, quantity.

Tees and angles, size of legs, thicknesses, length and quantity.

Plow beam section, size and lengths, weight of one piece, quantity and the name of the plow for which the beam is needed.

Small rivets, report size and weight each size.

Borax, estimate quantity in bin and elsewhere, and report in pounds; as a guide, a bag of borax weighs 100 lb.



The Jig Bin at the Time of Taking the Inventory. Each Jig Has a Separate Slip

Crushed coke, estimate quantity in tons, the average carload is 25 net tons.

Punches and dies, size and description, quantity of each size, stating whether in stock or in use. Report all that are 50 per cent. good or better as new; report all that are less than 50 per cent. good as used.

Coal, estimate quantity in tons: The blacksmith shop bin holds about 40 gross tons.

Firebrick, quantity and description of brick.

Fireclay, number of bags.

Paint Department

You will report actual weight or count of the following articles: Unused brushes, glass, putty; all paints, varnishes, oils and decalcomanias; naphtha, all reducers, empty barrels and half barrels and varnish or paint removers.

You can ascertain the weight or quantities, in unbroken packages, from the marks on them. Contents of broken packages must be weighed or counted.

Boiler Shop

You will report the following materials, supplies and manufacturing expense items in your department as follows:

Boiler plate, material—Report quantity of each size plate, with thickness.

Tank steel, material—Report quantity of each size plate, with thickness.

Boiler plate, goods in process—Report quantity of each size plate, with thickness and actual productive labor on each size plate.

Boilers, goods in process—This item will cover boilers that are not completed. Report actual plate sizes and thicknesses in each boiler not finished, approximate weight of rivets, braces, stays, gray-iron and malleable castings and also all labor on the individual parts and on the boiler itself.

Tank steel, goods in process—Report quantity of each size plate and thickness and actual productive labor.

Rivets—Total weight, all sizes.

Tubes—Quantity of each size and length.

Punches in stock or on the floor—Quantity of each size.

Castings, gray-iron, material—Quantity, description and symbol number and classification.

Dies, in stock or on the floor—Quantity of each size.

Castings, gray-iron, goods in process—Quantity, description and symbol number, classification and productive labor on same in your department.

Twist drills—Quantities and size, carbon or high speed.

Staybolts, dead soft steel—Quantity, size and length.

Braces, dead soft steel—Quantity, size and length.

Braces, pressed steel—Quantity, size and length.

Manhole saddles, complete—Quantities and sizes.

Pipe flanges—Quantities and sizes.

Staybolt taps, in stock or on the floor—Quantity, size and length.

Fireclay, plastic—Estimated weight.

Firebrick, boiler setting—Quantity.

Fireclay for firebrick—Estimated weight.

Firebrick for Cornish boiler linings—Number of sets and sizes of boilers.

Gaskets, material—Quantity and size.

Gaskets, tubular manhole—Weight.

Wire netting for Cornish boiler lining bricks—Number of lineal feet.

Castings, malleable—Quantity, description, symbol number and classification.

Angles, channels, etc.—Quantities, size, length and weight per foot, or if this is not known the thickness of web on I-beams and channels.

Through rods—Quantities, diameter, length and classification.

Boiler fitting-up bolts—Quantities and sizes.
Patch bolts—Quantities and sizes.
Pea coal—Estimate weight of coal in bin. The last carload weighed 28 gross tons.
Soft coal—Estimate weight.
Hollow staybolts—Quantity, size and length.
Garlock packing—Actual weight.
Chisels—Quantities and sizes.
Calking tools—Quantities and sizes.
Rivet sets—Quantity and sizes.
Staybolt sets—Quantity and sizes.
Soapstone pencils—Quantity and sizes.
N. B.—Include in boiler plate and tank steel all templates that may later be used as product.

Inventory of Electrical Stockroom Supplies

Mr. S—— will report supplies on hand, giving full description and referring to the illustration and number in ——— Company's catalogue No. 17.

All wire will be weighed and the weight of each kind reported.

There are certain items in this stockroom which were made in our own factory. The prices will be set on these by the cost department.

All so-called supply items in electrical stockroom are really manufacturing expense items, as they have previously been charged to certain departments or to general manufacturing expense.

APPORTIONING FACTORY FOR INVENTORY

Departments 1 to 5 will be in charge of foundry foreman: see special memorandum for foundry. This inventory will be reported on a tablet furnished for this purpose.

Department 6, First Division

Mr. S—— will have charge of this division, and be assisted by Mr. C—— and two or more helpers. This group will inventory everything on the first floor of this department, starting with the contents of the north shed and continuing southwardly to the south rail of foundry track, or in a line with same to east wall. The regular departmental blanks will be used for this purpose. We will start off with the numbers from 1 to 2500 inclusive. Mr. S—— will also inventory the contents of the gallery, starting at the south entrance to the wheel room and extending to the pattern department. This report will be made on blank sheets furnished for the purpose.

Department 6, Second Division

This group will be in charge of Mr. W——, assisted by Mr. H—— and two or more helpers, who will inventory everything on first floor south of the south rail of the foundry track or in line with same to east wall. This inventory will be reported on the departmental inventory slips, numbered from 2501 up to and including 4500.

Department 7

Mr. H—— will report, as per memorandum, concerning this department. This report will be written on blank sheets furnished by the office.

Twist Drills, Reamers, Etc., on the Floor Prior to the Collection of the Slips

Pat. No. and Description — Class No. 1 — Dept. No. 6

Part Name	Size	Wt. 1 Pc.	Material	12-31-14 Material Cost	12-31-14 Labor Cost		
100-Hole		585	1.2	1.20	1.00		

Above Costs based on 100 pcs.
No Mfg. Exp. included

Card Giving Information That Can Be Utilized from Year to Year in Taking the Inventory

Department 8

Messrs. W—— and B—— will report, as per memorandum, concerning this department, reporting materials according to classification, goods in process according to classification, supplies, manufacturing expense items, jigs, etc. Slips starting with 4501 up to and including 5200 will be apportioned to this division.

The remaining eleven departments were similarly apportioned.

METHOD OF SORTING INVENTORY SLIPS

Each department in the factory will be treated as a separate unit, and all the inventory slips from any one department will be sorted into the following divisions: Materials, supplies, goods in process (17 classifications), manufacturing expense items, jigs and tools other than in stockrooms, including files, chisels, planer and lathe tools, punches and dies, twist drills, reamers and cutters.

The inventory slip sorting cabinet will be used for this purpose.

This cabinet is simply a box with proper size pigeon holes, the depth being such that the slips when placed in flat, will be about flush with the front. With this sorting box 20,000 slips were sorted in 32 hours.

METHOD OF ASCERTAINING COSTS

All purchased articles will be priced by purchase and cost departments.

All gray-iron castings will be figured according to a standard schedule.

All brass, bronze, hydraulic metal or connecting rod box metal castings will be priced by cost department.

All productive labor costs, including assembling, erecting and testing, will be figured by cost department, assisted by foremen and assistant foremen, except in the boiler shop, the productive labor on plates and on boilers partly finished will be reported by Mr. R——. Be careful to add to groups, assembling, erecting and testing labor or piecework price.

All lumber will be priced by Mr. S——, assisted, for grading purposes, by Mr. L——.

All materials, supplies and semi-finished or finished articles which are either second-hand or scrap will be priced by Messrs. S—— and R——, assisted by sales department when necessary. All items which are not saleable or useable will be scrapped after consultation between foremen and office.

GENERAL REMARKS

We have shown the 4 x 6-in. departmental inventory report. The two accompanying halftones illustrate a jig bin, with a separate slip at each jig and various lots of twist drills, reamers, etc., lying on the floor, and in the rear a number of mandrels and pulleys, each having its separate slip. These photos were taken just prior to the collecting of the slips.

A large loose leaf binder sheet was used in entering up the slips, one filled in and totaled being reproduced. The sheets were numbered consecutively for each department. That is, the sheets for each department started with No. 1 and continued consecutively until all items were entered. It might be well to state here that each department is known by its number, rather than by name. Also the entire product is divided into 17 classifications. The various department binder sheets were separated by cloth tabbed index sheets bearing the department number on the tab.

Another illustration shows the final summary sheet, which was planned to give an instantaneous comparison for several years. From these sheets can be ascertained, if required, the total number of pounds of any particular kind of material and its total value. This information may show up some items of which the quantity on hand is in excess of normal requirements. The various rates for gray-iron castings were ascertained in advance by carefully working out the costs of a large variety of castings for each limit of weight given in the schedule.

A lot of preliminary work can be gotten out of the way before the real inventory rush starts. For instance, the writer had all the cards sent in from the various stockrooms a week before inventory time. These were entered on the inventory binder sheets, the rate per piece of 100 pieces was figured out and at the proper time the quantities were filled in. This in itself was a big lift. Also the production department started in weeks ahead and carefully checked their records, also checking the weights they had, or securing those they were short.

As it was necessary to figure thousands of items of goods in process, which included material and labor, and as a large proportion of these costs could be utilized in subsequent inventories, provision was made to record these figures. The 4 x 6-in. card shown will not only give, when properly filled in and indexed, an instantaneous record for next year, but will provide at all times a ready reference, for the compiling of a repair list or prove of great assistance to the cost department, either as a check or as a cost unit of a group of parts. It will be noted that no overhead or manufacturing expense is included, simply material and labor. Also that the unit basis is 100 pieces or groups, and further, that there are two blank columns at the right, which can be dated and used in the future, giving a record of the cost then, which will show whether the unit cost has decreased or increased. The percentage of manufacturing expense can be easily added when necessary. The other illustrated form is to record the finished product. This is really a monthly as well as yearly inventory. The unit values are secured from the cost department and changed when necessary.

The larger percentage of the inventory was taken on the departmental inventory reports which were numbered from 1 up. These were padded in lots of 100 and apportioned to each department. A record was kept of all numbers and the name of the party to whom they were given. In some parts of the factory we used ordinary letter tablets for recording, but next year nothing but the printed forms will be used, as they are easier to sort, handle and calculate.

The writer personally sorted 20,000 slips in 32 hours by the sorting box, separating them into goods in process, according to the 17 classifications, materials, supplies, etc., according to departments. Each slip was then stamped at the top "Goods in Process," etc. At no time could the slips have become mixed beyond the possibility of sorting them out properly again.

Whoever sorts the slips should have a thorough knowledge of the materials used in all of the departments, should also be well acquainted with the product of each department and be familiar with the pattern numbers for castings, etc. All of this information is gained by experience and therefore it is necessary that the sorting be done by some one who comes in daily contact with the varied departments and manufactured lines.

To simplify the pricing of as large a number of items as were handled in this case, the purchase department records of net prices and discounts must be complete. Correct card records of all prices are, however, easy to install and maintain. Naturally, the real work of the inventory falls on the shoulders of a few, but enthusiasm and energy coupled with a thorough understanding of what is required will take the workers to the goal that much sooner.

The length of time required to record the various items in the factory could be made as short as the supply of competent recorders will permit. The men that write up the slips must have a fairly good understanding of the output of the department they are recording. By dividing each building into as many units as there are floors or by a further division of each floor, the actual time can be at least reduced 50 per cent. The actual expense, however, will not be reduced. The less time, the more men required. Where it was deemed advisable to divide a department into two or more inventory sections, we had the painters run a dotted black line from one prominent point to another, this prevented confusion not only in recording but also in the collecting of the slips. When the collector came to the black line he knew that it was no use crossing over for the next higher numbered slip, so he turned to the right or left as necessary.

It is not presumed that this system in its entirety could be adopted by all factories, but there should be no reason why the larger percentage of the system would not be applicable, changed, of course, to meet existing needs.

One of the first points to be considered would be the results required. A grand total of dollars and cents is all very nice, but there may be a number of "niggers in the woodpile" that can only be discovered by proper division of the total. The final summary of this inventory included over 400 items and will be compared item by item with future inventories. Of course, if additional items are necessary in the future, they can be easily added, or if certain items become obsolete they can be dropped.

The percentages of overhead charges will vary with the different departments. In slack times the percentage rapidly increases and when all departments are running full time and with a full force of operators, the percentage is considerably less and what we might call normal. It is the normal figures that should be taken into account when figuring the inventory, otherwise the totals will quite possibly show a higher valuation on a minimum stock than they would, at other times, indicate on a much heavier stock.

Simply because the percentage of overhead charges increases, owing to the smaller volume of output, it does not necessarily follow that the sales department is going to be able to secure better prices for the various lines; if anything, the reverse takes place.

It will be noted that we have used the date January 1 rather than December 31. Our reason for doing this was to make our records agree with

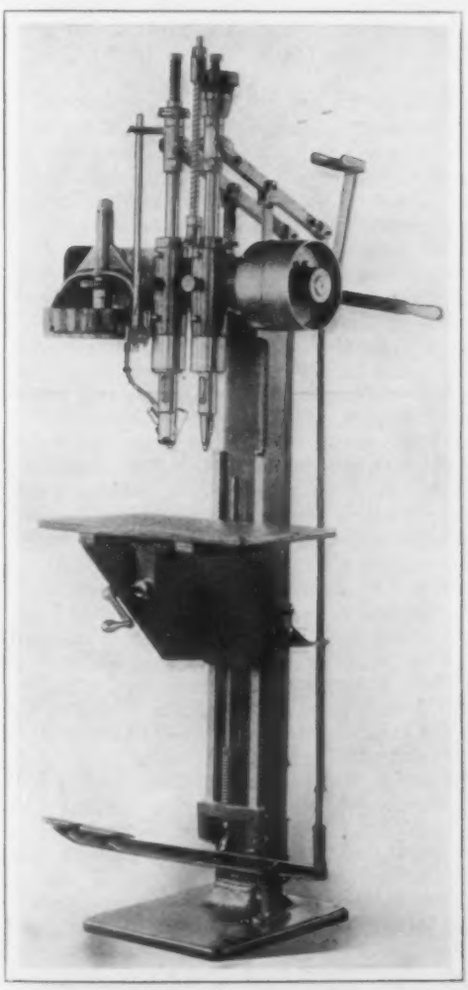
the production department records; for instance, if the inventory would show that we had 1000 pieces of any particular item on hand January 1, the production record would indicate the same quantity, as their records start from the first of the year. Of course, in taking the figures into account for the closing of the books we consider the totals as being of December 31.

We kept careful account of the expense of the inventory from start to finish, including all printed forms, all labor, both in the factory and in the office, and the total figure indicated that it cost slightly less than $3 for each $1000 of the inventory, or, in other words, about 0.03 per cent.

Special Machine for Assembling Room

The Reynolds Pattern & Machine Company, Moline, Ill., has brought out a special machine for use in the assembling rooms of sewing machine factories. In these plants in particular, and also in others, it is the practice to fasten parts together by temporary screws while machine operations are being performed and fitting done, these temporary fastenings being removed and the permanent ones inserted when the parts are finally assembled. This new machine is intended to perform both operations in the one machine.

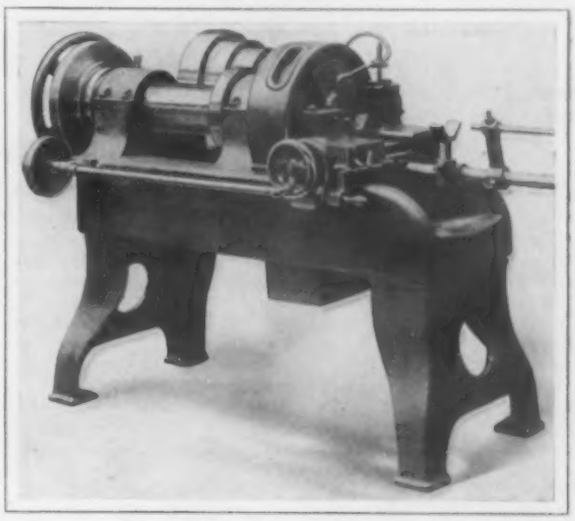
In general construction the new machine is the same as the builder's standard line of screw driving machines, but the especially distinctive feature is the use of an auxiliary spindle adjacent to and parallel with the main screw driving spindle. This auxiliary spindle, which is driven in a left-hand direction, is operated by an independent foot lever and carries a bit for removing the screws. Normally this bit does not revolve, but when it is brought down by the action of the foot lever and entered in the slot in the head of the screw, it commences to revolve and backs the screw out of position rapidly. The work is then moved slightly to the left and the new screw is inserted by the screw-setting spindle, the screws being fed from the magazine the same as in the regular line of screw driving machines. If desired, the machine can also be used for driving the temporary screws at first.



A Special Machine Designed for Use in the Assembling Room for Removing Temporary Screws and Inserting the Permanent Fastenings

Trimming Machine for Shrapnel Shells

The W. P. Davis Machine Company, Rochester, N. Y., has brought out a cutting-off machine of an improved type. This machine is a redesigned



A 4½-In. Cutting-Off Machine Designed for Trimming the Rough Ends of Shrapnel Shells after the Cuppings Come from the Forges

form of the one built hitherto and is intended principally for trimming the rough ends of shrapnel and lyddite shells after the cuppings have come from the forges. Two sizes of the machine are built, a 4½ and a 6 in., the former being the one illustrated.

While the design and method of operation of both machines have been improved over the earlier ones of the same size, the change in design is especially noticeable in the smaller one. The 4½-in. machine has been built especially for rapid work and the frame of the bed is cast in one piece and is tied together at the ends. Cast iron is used for the spindle and the gears are heavier than formerly. The changes in the 6-in. machine are not so marked, although the equipment has been modernized.

The Terry Steam Turbine Company, Hartford, Conn., has appointed Merton A. Pocock, 400 Endicott Building, St. Paul, district sales manager for Minnesota, North Dakota and South Dakota. This arrangement supersedes the previous selling agreement with the Robinson, Cary & Sands Company, St. Paul. The appointment is also announced of the Hawkins-Hamilton Company, Peoples National Bank Building, Lynchburg, Va., as representative for Virginia.

The Charles Millar & Son Company, Utica, N. Y., manufacturer of cast-iron pipe, lead pipe, solder, etc., has opened a branch store and warehouse in Binghamton, N. Y., with the intention of carrying in that city a stock of plumbers', tinners' and steam fitters' supplies.

National Association of Manufacturers

Important Topics Considered at the Twentieth Annual Convention Held in New York City Last Week—Ex-President Taft Scores Labor Leaders

The attendance at the twentieth annual convention of the National Association of Manufacturers was fully representative of its membership, although not up to the high mark of previous years. The sessions were held in the Waldorf-Astoria, New York, May 25 and 26.

PRESIDENT POPE'S REPORT

In his annual report Col. George Pope, president of the association, ably and cogently discussed current business conditions. Referring to the European war, he expressed the sense of deep appreciation of the members toward President Wilson for his strict adherence to the principle of neutrality. The war, he claimed, must bring this country forth with enhanced prestige, strength and independence which will greatly benefit us in years to come. On this point he said:

> Our markets must of necessity be patronized to an extraordinary extent by the nations of Central and South America, as well as the European countries, both neutral and belligerent. We shall be called upon to sell and deliver our products upon a scale and magnitude heretofore unmeasured, but we must be alert to meet this extraordinary emergency and in a position, not only to manufacture, but to deliver properly the commodities demanded of us. If there ever was a time for close, steady application of the best ideals of international trade by our home producers, it is the present. Our products will be critically examined and rigidly compared with those of other nations. We must realize, therefore, that our opportunity is coupled with great responsibility. "Made in America" should not be merely a patriotic expression of commercial pride. It should mean quality, courtesy and honorable methods.

Referring to the work of Government commissions, President Pope said, in part:

> The original purpose of the Commission on Industrial Relations was primarily to determine the causes of industrial and social unrest. This commission entered upon the discharge of its duties about a year ago. It soon became evident that there was an obvious intent by certain of its members to strengthen the position of organized labor with respect to its particular claims and assertions in the field of our complex industry. The chairman of the commission became conspicuous by unguarded public statements with respect to certain matters hardly within the scope and jurisdiction of its work and certainly not within his scope as chairman. Questions put to witnesses gave additional and conclusive weight to the inference that several members were prompted by a partisan and antagonistic attitude. The result is unfortunate, not only because of the benefits which might have accrued from an impartial examination of the industrial problems of our country, but particularly unfortunate in that a commission appointed by the President of the United States, and confirmed by the Senate, should permit itself to be actuated by lines of conduct which have tended to so severely discredit its motives and its purpose. Plainly, in my opinion, the conduct of the Commission on Industrial Relations has been a failure.

With regard to the Federal Trade Commission, President Pope said that its most important function should be the zealous care which it should observe in applying its corrective efforts to irregular or corrupt business, and leave undisturbed fully 90 per cent. of business which is conducted on a legitimate and honorable basis. "It is not clear to us to what extent the commission will exercise supervision in and about business conduct. Let us express the hope that it will never become meddlesome, for business is very sensitive and it requires no skill whatever to frighten the delicate senses of capital or disturb the force of creative enterprise."

COMMITTEE REPORTS AND ADDRESSES

Interesting reports were received from committees appointed to consider such subjects as banking and currency, the use of the union label, patent legislation, industrial education, accident prevention and workman's compensation, uniform State laws, bankruptcy, interstate commerce and federal incorporation, fire prevention and industrial betterment.

The committee to consider industrial betterment has had investigators at work for a number of months studying the minimum wage legislation of various States and nations, and its report was the first of a series on similar subjects, and also the first expression of organized employers on the subject. The members of the committee are: Ferdinand C. Schwedtman, Racine-Sattley Company, Springfield, Ill., chairman; Howell Cheney, silk manufacturer, South Manchester, Conn.; M. W. Alexander, General Electric Company, Lynn, Mass.; S. P. Bush, Buckeye Steel Casting Company, Columbus, Ohio; James A. Carr, American Seeding Machine Company, Richmond, Ill.; John W. Ferguson, building contractor, Paterson, N. J.; Henry D. Miles, Buffalo Foundry & Machine Company; A. Parker Nevin, counsel, and Dr. Albert A. Snowden, secretary. The committee states its main conclusions on the legislative minimum wage in the following form:

> 1. We hold that historically the attempt to regulate and control wages by the State has invariably failed.
> 2. We find that the general operation of the legislative minimum wage, everywhere, has been unsatisfactory to employees and employers.
> 3. We find that the facts upon which the legislative minimum wage in the United States have been based are not sufficient to warrant us in recommending it at this time.
> 4. We find no prevailing demand for legislative minimum wage on the part of either the employer or the employee.
> 6. We find that although certain arguments are plausibly advanced in support of the measure, the weight of adverse arguments is clearly against it.

It is further set forth in the report that the application of the minimum wage is fraught with peculiar difficulties in this country. "Unless all States adopt identically the same scale in the same industries there will be constant inequalities between markets producing the same product."

An important recommendation in the report on banking and currency is the consolidation of all note issues into one only, emanating directly from the Government through a federal reserve bank and guaranteeing it with the same reserves that are guaranteeing today the different classes existing. It is pointed out that we have now ten forms of currency, namely: 1. Gold coin. 2. Silver dollars. 3. Subsidiary silver. 4. Base metal coins. 5. Gold certificates. 6. Silver certificates. 7. Greenbacks. 8. Treasury notes. 9. National bank notes. 10. Federal reserve notes. Some of these are full legal tenders, others are so only under certain restrictions, and others not at all.

Ferdinand C. Schwedtman delivered an address on "Social Insurance." Dr. Eugene Lyman Fish, New York, spoke on the "Periodic Physical Examination of Employees; Its Social and Economic Value." Walter Drew, New York, general counsel of the National Erectors' Association, discussed the "Federal Commission on Industrial Relations," and Arthur D. Little, Boston, spoke on "Chemical Audits."

A memorial service for the late David M. Parry, former president of the association, was held at noon on the first day. The exercises consisted of prayer, eulogies by several members and singing by a quartette.

At the afternoon session Edward H. Foot delivered an address on trade opportunities in southeastern Asia and the Dutch Indies. Others dwelt on trade with Brazil and South America as a whole.

James A. Emery spoke at some length at the Wednesday session on the Federal Trade Commission. Among other things he said: "This commission is in many respects the most notable experiment in business

regulation which any nation has undertaken, and its terms express a tendency of thought which can transfrom the nature of our government more radically than constitutional amendments. Whatever our antecedent opinions with regard to this experiment in regulation, the business world owes it to itself and to the spirit of the time to co-operate patiently and sympathetically with the Trade Commission. If it fails, let it fail because it cannot deliver the goods. . . . . If the commission, representing as it does the public interest, shall, as the result of its inquiries into the field of foreign competition, bring home to our own people the necessity of permitting business co-operation in the foreign field which is now denied to the American exporter, we shall have gone a long way in creating a more rational public opinion on the necessity of permitting regulated co-operation in an age when the American business man must meet it, in its most complete form, in every European market."

RESOLUTIONS ADOPTED

Resolutions adopted by the association, while omitting any mention of the tariff situation, declare that "the war in Europe has caused a world-wide dislocation of commerce, has interfered with the normal financial conditions and the normal movements of the agricultural products of the United States, and the natural advantages flowing to this country," and authorize the appointment of a committee "to co-operate with other organizations and with Congress for the purpose of bringing about a more favorable condition to meet the emergencies as they at present exist or may develop."

Another resolution says that one of the most impressive lessons growing out of the European war is that the United States should adopt "prompt and vigorous measures to secure the establishment by private enterprise of lines of American merchant steamers to the principal ports of the world, in order that this country may no longer be dependent for nine-tenths of its ocean-carrying trade by foreign ships," and indorsed the work of the National Marine League.

By formal resolution the manufacturers extended to the Federal Trade Commission the "assurance of their sincere hope for a just, wise and beneficent administration of the great powers with which it is invested, and that we further tender to the members of said commission our willingness to act in such cordial co-operation with their work as may be proper and seemly."

The action of the United States Supreme Court in sustaining the judgment in the so-called Loewe case, wherein the application of the Sherman anti-trust act to the action of the hatters' boycott was confirmed, was the subject of other resolutions praising the successful efforts of the American Anti-Boycott Association in the matter.

Directors were elected and the session was closed by vesting in the executive committee the authority to set the time and place for the next convention. Mayor Preston, of Baltimore, asked that his city be given consideration.

An exhibition devoted to industrial education was held in the Colonial Room in connection with the convention, and attracted many visitors.

THE BANQUET

At the customary banquet, on the evening of the last day of the convention, John Kirby, Jr., former president of the association, was toastmaster, and the speakers were ex-President William Howard Taft and Senator Warren G. Harding of Ohio. Mr. Taft's subject was "The Clayton Act and Other Things." He said the Clayton act has done a good thing in formulating the proper procedure in the issuing of preliminary injunctions without notice in all cases where such extraordinary remedy is needed, but it was passed for political purposes, to satisfy the demands of the leaders of the American Federation of Labor with the hope of securing the vote of the labor organizations at subsequent elections, and he scored the cowardice of representatives who yield their own convictions as to how they ought to vote on such measures in fear of the organized power of the unions in their respective districts and States. He vigorously attacked the leaders of the Federation, charging them with being intoxicated with their political powers. The Federal Trade Commission he described as merely a tribunal of investigation for reporting facts and the application of the law which can only be made by the confirmation of the court; in other words, it is nothing but a glorified bureau of corporations with larger salaries and greater powers of investigation.

Senator Harding, who spoke on "Manufacturing and Popular Sentiment," declared that the greatest menace to American progress is the professional baiting of big enterprises. He said that his deliberate judgment is that the standards of the business world were never so high as they are today. Methods of 50 years ago would not be tolerated today because communication, transportation and the glare of publicity have made for the higher order. More than that, there is a loftier conscience impelling the conduct of men. He further said:

> When Europe, penitent and prostrated, turns to the rehabilitation and construction of peace there will be a struggle for industrial supremacy the world has never witnessed. In our desire for American eminence we must be equipped for the struggle. We have the resources, the genius, the talent, the efficiency to justify the highest aspirations; we have the encouragement of marvelous development already made. But if we mean to go on, if we hope for the maintained stride of this New World giant of industry and commerce, we must hold him unshackled and unafraid. We see him hesitant and halting, influenced by fear that comes from attack at home. There ought to be an American spirit and an American aspiration to inspire and encourage. We want big business and little business and profitable business—all righteous business. We want big factory and little factory and successful factories everywhere.

OFFICERS ELECTED

At a meeting of the board of directors of the association, held at the Waldorf-Astoria, May 27, the following officers were elected: George Pope, president; George S. Boudinot, secretary; J. P. Bird, general manager and assistant treasurer.

The members of the board, as elected May 26, are as follows: George Pope, Pope Mfg. Company, Hartford, Conn.; J. G. Battelle, Columbus Iron & Steel Company, Columbus, Ohio; H. S. Chamberlain, Roane Iron Company, Chattanooga, Tenn.; Howell Cheney, Cheney Bros., Inc., South Manchester, Conn.; Alfred E. Cox, Atlantic Works, East Boston, Mass.; Oscar Elsass, Fulton Bag & Cotton Mills, Atlanta, Ga.; F. B. Farnsworth, Eastern Machinery Company, New Haven, Conn.; Isaac W. Frank, United Engineering & Foundry Company, Pittsburgh, Pa.; John Kirby, Jr., Dayton Mfg. Company, Dayton, Ohio; Stephen C. Mason, McConway & Torley Company, Pittsburgh, Pa.; Constant Meese, Meese & Gottfried Company, San Francisco, Cal.; C. Edwin Michael, Virginia Bridge & Iron Company, Roanoke, Va.; H. E. Miles, Racine, Wis.; M. W. Mix, Dodge Mfg. Company, Mishawaka, Ind.; Ludwig Nissen, Ludwig Nissen & Co., New York City; Enos Paullin, Ferracute Machine Company, Bridgeton, N. J.; F. C. Schwedtman, Racine-Sattley Company, Springfield, Ill.; George D. Selby, Selby Shoe Company, Portsmouth, Ohio; E. C. Spear, Cheney Bigelow Wire Works, Springfield, Mass.; Albert J. Thornley, Narragansett Machine Company, Providence, R. I.; John Trix, American Injector Company, Detroit, Mich.

The International Traders, Ltd., 6 Church street, New York, of which George Bennett Hanford is manager, has submitted to large New York financial interests and to representatives of South American governments a proposition to establish a fleet of 50 ships of 5000 to 6000 tons each to handle traffic between the United States and South America. The company has closed a large contract for coal to be shipped to South America over the next three years from mines in Virginia and Tennessee through Charleston, S. C., and expects to handle other classes of merchandise from and to this country. Associated with Mr. Hanford are the Studebaker interests of South Bend, Ind., and others engaged in the export trade.

Bureau of Standards and Railroads Confer

Co-operation Sought Between the Railroads and the Bureau Regarding Best Method of Studying Steel-Rail Problems

WASHINGTON, D. C., June 1, 1915.—On invitation of Dr. S. W. Stratton, director of the Bureau of Standards of the Department of Commerce, representatives of 24 railroad systems met at the bureau the past week to confer regarding the best method of securing efficient co-operation between the railroads and the bureau in the study of problems connected with the purchase and testing of material with special reference to the production of high-grade steel rails. The immediate object in calling the conference was to put before the railroad engineers the work thus far accomplished by the bureau and to seek their advice as to the most promising methods of attacking current problems and of enlisting the aid of manufacturers of material, the rail mills being particularly in mind. The railroad representatives present were as follows:

J. C. Ramage, superintendent of tests, Southern Railway Company; J. R. Onderdonk, engineer of tests, and W. S. Bouton, engineer of bridges, Baltimore & Ohio; J. H. Nuelle, chief engineer, New York, Ontario & Western; A. G. Trumbull, mechanical superintendent, and R. C. Falconer, superintendent of construction, Erie; Edward Gagel, chief engineer, New York, New Haven & Hartford; J. E. Willoughby, assistant chief engineer, Atlantic Coast Line; J. E. Crawford, chief engineer, Norfolk & Western; M. C. Byers, assistant to the president, Western Maryland; A. S. Baldwin, chief engineer, Illinois Central; A. W. Newton, assistant to the president, Chicago, Burlington & Quincy; P. H. Dudley, consulting engineer, New York Central; E. E. Adams, consulting engineer, Union Pacific; W. H. Finley, chief engineer, Chicago & Northwestern; H. B. MacFarland, engineer of tests, Atchison, Topeka & Santa Fe; W. H. Penfield, assistant to vice-president, Chicago, Milwaukee & St. Paul; J. B. Young, chemist, Philadelphia & Reading; A. W. Gibbs, chief mechanical engineer, and W. C. Cushing, chief engineer maintenance of way, Pennsylvania; R. Montford, consulting engineer, Louisville & Nashville; H. J. Force, chemist and engineer of tests, and G. J. Ray, Delaware, Lackawanna & Western; Robert Job, chemist, Lehigh Valley; Crosby Miller, bridge engineer, Chesapeake & Ohio; C. A. Morse, chief engineer, Chicago, Rock Island & Pacific; and J. M. MacMartin, chief engineer, Delaware & Hudson.

OUTLINE OF INVESTIGATIONS UNDERTAKEN

The conference opened with an address by Director Stratton, who said that the efforts made by the bureau experts along the lines reflected in scientific work thus far undertaken would be of little value unless results could be practically applied on a broad scale to aid in the solution of the engineering problems which the great transportation systems and industrial plants of the country are now endeavoring to solve. As a basis of discussion, he laid before the conference the following outline of investigations which the bureau has undertaken and which are of special interest to the railroads and steel mills:

1. Foreign specifications concerning railroad material and accidents.
2. Rail failure reports for Interstate Commerce Commission and the Isthmian Canal Commission.
3. Sound ingots and rails:
   a. Hadfield preliminary series of ingots tested by bureau.
   b. 100 tons Hadfield, 100 tons comparison ingots to be tested.
   c. Proposed work on other special ingots: Titanium-treated, Talbot, etc.
4. Test ingots: Survey of and choice of type, with co-operation of American Society for Testing Materials.
   a. Proposed relation of heat and rail analyses.
5. Oxides, slag and gases in rail steel: Methods of analysis.
6. Shrinkage and finishing temperature of rails and physical properties of rail steel.
7. Distribution of temperatures in cooling rails of various sections: Proposed investigation by bureau.
8. Transverse fissures in rails.
9. Magnetic testing of rails and spring steel.
10. Chilled carwheels: Projected investigation: Statistics, foundry practice, mixtures, effect of sulphur, braking and internal strains, strength of, best design, properties of hot cast iron, soaking pit practice and relation of combined carbon to annealing.
11. Tin fusible boiler plugs.
12. Physical tests of rails; internal stresses and stresses produced by externally applied loads.
13. Column tests made with the co-operation of the American Railway Engineering Association.
14. Miscellaneous problems:
    a. Failure of structural bronzes.
    b. Standard test bars at 88 Cu—10 Sn—2 Zn.
    c. Softening of locomotive cylinder packings.
    d. Standard chemical samples of metals.

Director Stratton also laid before the conference the full translated text of the foreign specifications concerning railroad material and data regarding accidents recently obtained by correspondence from England, France, Germany, Belgium, Holland, Italy, Russia and Sweden. Some of this material has been available in more or less complete form, but the bureau has just been able for the first time to secure the text of all the specifications of the principal foreign countries of interest to American railroad engineers.

CHANGED ATTITUDE OF COMMERCE COMMISSION

The rail failure reports submitted cover those heretofore made for the Interstate Commerce Commission and for the Isthmian Canal Commission. The substance of the most important of these reports has appeared in *The Iron Age*. In this connection the attitude of the Interstate Commerce Commission toward the railroads of the country and the use it has made of reports of rail failures came in for considerable spirited discussion by the conference. Until quite recently the commission has conducted its investigations in an inquisitorial spirit, its apparent object being rather to discredit the railroads and steel mills than to ascertain the truth regarding the causes of rail failures in the hope of minimizing the accidents due thereto. Director Stratton very diplomatically drew attention to the more conservative policy which now appears to dominate the commission and made it clear that the work of the Bureau of Standards was conducted with but a single object in view, namely, the ascertainment of truth by the most approved scientific methods and for the purpose of assisting the business men of the country in all lines in solving the problems encountered from day to day.

The discussion developed the fact that the recent apparent change in the attitude of the Interstate Commerce Commission and the friendly spirit of co-operation which the Bureau of Standards has shown from the inception of its organization have done much to dispel the feeling of distrust of Government institutions entertained by many business men as the result of the overzeal of officials in conducting the inquisitorial investigations which have formed so important a part of the Government's activities in recent years.

TESTS TO BE MADE OF HADFIELD INGOTS

In discussing the subject of sound ingots and rails, the representatives of the Pennsylvania Railroad described in detail the important test about to be made with rails now being rolled by the Maryland Steel Company from 100 tons of Hadfield ingots and from an equal quantity of the best obtainable ingots of domestic manufacture. The fact was pointed out that the Hadfield ingots have "gone cold" as the result of their journey to this country, and both the railroad engineers and Dr. G. K. Burgess, the metallurgical expert of the bureau, agreed that some allowance should be made in

testing the rails produced from the imported ingots because of this fact.

It is the purpose of the Pennsylvania Railroad to put down the rails made from these two lots of ingots on its main line and to observe their behavior with the closest possible attention. In this connection, Dr. Burgess described the tests the bureau had made with a preliminary series of nine Hadfield ingots, demonstrating their high quality and outlined the proposed work of the bureau with special ingots treated with ferrotitanium and those produced by the so-called Talbot "squeezing" process.

MAY REQUIRE ANALYSES OF FINISHED RAILS

Considerable discussion followed the introduction of the topic of testing ingots with reference to the selection of type in co-operation with the American Society for the Testing of Materials. It is the consensus of the engineers and the bureau's experts that there should be a careful investigation of the relation of the test ingot to the commercial product, of which, under present practice, it is not always an accurate index. Many of the engineers present expressed the opinion that the railroads will ultimately buy their rails on the basis of tests that will ignore the ingot that is made from a single heat and will insist upon analyses and examinations of specimens of finished rails.

The projected investigation of the bureau into the methods of analysis of oxides, slag and gases in rail steel was discussed at length. This phase of the subject of rail production has been but little developed and it was the opinion of the majority of the delegates that its importance had been underestimated. Comprehensive work by the bureau's experts is about to be undertaken and the results made public at the earliest practicable date.

The discussion of the shrinkage and finishing temperature of rails and physical properties of rail steel embraced the details of the technical paper on this subject recently prepared by Dr. Burgess and his assistants, a synopsis of which was published in *The Iron Age*.

Dr. Burgess described to the delegates the projected investigation concerning the distribution of temperatures in cooling rails of various sections. The bureau has given much attention to this subject and with the co-operation of the steel mills will secure a large amount of data before conclusions are attempted. Some unexpected developments have been encountered in this investigation and it is believed that the final results will be of great value to manufacturers and consumers alike.

TRANVERSE FISSURES IN RAILS

The interesting subject of transverse fissures in rails, which has recently attracted so much attention, was touched upon at intervals throughout the conference. In prosecuting the investigation heretofore undertaken, the bureau will soon address a letter to each important railroad system of the country submitting a list of questions and asking for statistics embraced within the experience of each road regarding the occurrence of fissures, their frequency, general characteristics, location, the method of manufacture of the steel from which the rails were rolled, etc. In co-operation with this work the railroads have agreed to submit samples of rails that have developed fissures and to supply the bureau with all possible information.

While this preliminary work is in progress the bureau will determine the chemical, physical and metallographic tests that are to be employed so as to reach a uniform basis for all examinations. In connection with the tests, comparisons will be made of the properties of rails that have given long and satisfactory service in tracks with those of rails more recently laid which have developed fissures, to distinguish, if possible, the good from the bad and to ascertain the cause of difference.

In this connection Dr. P. H. Dudley, of the New York Central system, described studies of certain rails showing marked qualities of excellence which, however, he had not been able to attribute to any particular characteristic. Mr. Montfort, representing the Louisville & Nashville Railroad, reported observations on certain 70-lb. rails laid several years ago which have given much better results than 80-lb. rails much more recently put down.

The bureau experts stated that a rail from a German mill was under examination, which had disclosed fissures, although evidently manufactured with great care. The work of the bureau in connection with the investigation of transverse fissures, it was announced, would include a comprehensive study of mill conditions, for which the principal manufacturers of rails have already promised their hearty co-operation.

The magnetic testing of rails and spring steel, now being carried on by the bureau, has already produced important results which are being compared with those of unofficial experts who are studying the same subject. Sufficient progress has been made, it was stated at the conference, to warrant the statement that the principal physical properties of rails and spring steel can be determined by magnetic tests, and there is promise that the testing methods now in use may be so refined as to permit the detection of transverse fissures.

The result of an important series of tests on tin fusible boiler plugs made by the bureau were laid before the conference. The bureau's experts found that if the plugs were made of pure tin they were very efficient and could be relied upon to melt at the desired heat point. If, however, a small quantity of zinc were present, even so little as three-tenths of 1 per cent., an alteration took place, changing the substance to tin oxide which in tests showed so high a melting point as to render the plugs valueless. W. L. C.

Hydraulic Press Operations Enlarged

The Prest-O-Lite Company, Indianapolis, Ind., whose pressed steel operations have developed in an important way in the manufacture of gas tanks, is about to add an 800-ton hydraulic press of the design built by the Hydraulic Pressed Steel Company. The press work will be further facilitated by the installation of a 5-ton Pawling & Harnischfeger crane to serve all of the presses. The new 800-ton press is intended for the drawing of large welding cylinders, 12 x 38 in., which are now drawn from a 40-in. circle in eight press operations, including the cupping from 40 in. to 29, 26, 23, 20, 17, 14 and 12 in. consecutively with a final draw at 12 in. With the larger press it is expected that at least two and probably three of the steps may be eliminated in the making of shells in the above sizes, and in addition that shells of 30 in. in diameter and 48 in. long will be formed from 60-in. circles.

The Canadian-American Power Company, Niagara Falls, Ontario (the Canadian branch of the Niagara Falls Power Company, Niagara Falls, N. Y.), will make extensions of its plant in the near future involving the expenditure of $1,000,000. Three power units of 12,500 hp. each are now to be added to the seven units of the same capacity now in operation and later a fourth unit will be installed, which will complete the total capacity of the plant. Most of the power now generated is sold on the United States side of the border, but it is expected that the additional current to be generated will be largely used on the Canadian side. The present supply of water to penstocks will be sufficient for the enlarged plant.

Henry Disston & Sons, Inc., Philadelphia, Pa., donated a sterling silver pitcher as one of the trophies for the golf tournament of the Manufacturers' and Distributers' Golf Association, held June 1 and 2. This association is composed of members of the American Supply and Machinery Manufacturers' Association and National Supply and Machinery Dealers' Association. The tournament was played at the Whitemarsh Valley Country Club, Chestnut Hill, Philadelphia.

The E. W. Bliss Company, Brooklyn, N. Y., has opened a Detroit office at room 2011, Dime Bank Building.

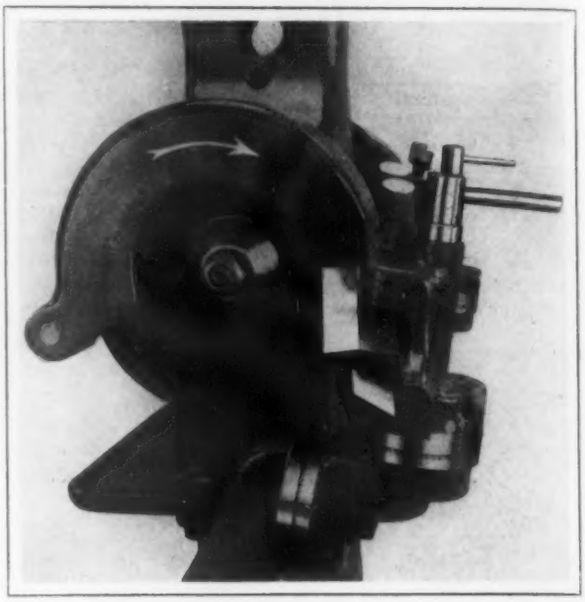
Gear Generator Tool Grinding Machine

The Gleason Works, Rochester, N. Y., has developed a machine for sharpening the tools used on its two-tool type bevel gear generating machines. It is a single-purpose machine as it sharpens the tools only and is similar to the special machines that have been used by the builder in its works for several years. The advantage claimed for the use of this grinding machine is that the tools are all ground with a cutting edge exactly square with the cut which eliminates the necessity of grinding the angle of the edge to a gauge, and as the grinding is against the cutting edge of the tool it is emphasized that the turning up of a burr is eliminated and the danger of overheating the cutting edge minimized.

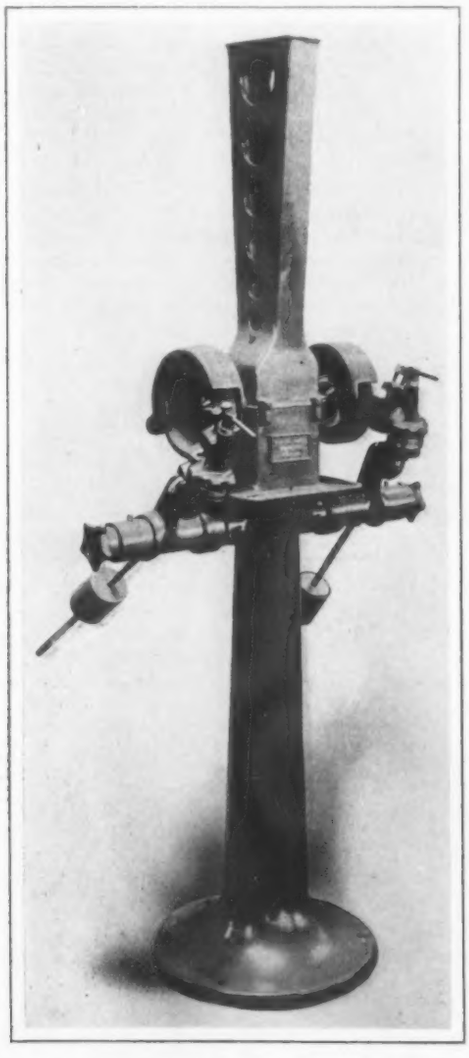
The machine consists of two wheels, one for the upper and one for the lower tool, so that two operators can grind tools at the same time. Under each wheel is an adjustable swinging arm carrying a universal tool holder. The holders are arranged so that the grinding is against the cutting edge of the tool. A turning movement on its binding stud is provided for each tool. There is a positive stop which is set one way for 14½-deg. tools and the other for 20-deg. tools, lines on the side of the holder indicating the direction which it should be set.

The wheels run in one direction, as indicated by an arrow on the guards, and a swivel joint enables any special pressure or rake angle to be provided for. The wheels used are of the cup type and are 7 in. in diameter with a 2-in. face. The hardened steel spindle runs in bronze bearings having an adjustment for wear.

The machine is driven by belt from a countershaft running at 675 r.p.m. The floor space occupied measures 18 x 31 in. and the net weight of the machine is 300 lb.



A Nearer View of the Wheel Showing a Tool in Position for Sharpening



A Recently Developed Grinding Machine for Sharpening the Tools Used in a Bevel Gear Generating Machine

Westinghouse Electric Report

The annual report of the Westinghouse Electric & Mfg. Company for the year ended March 31, 1915, shows a falling off in gross sales of a little more than $10,000,000, compared with the previous year. In the month immediately preceding the outbreak of the European war operations at the plant at East Pittsburgh were virtually suspended by labor troubles, and in the last eight months of the fiscal year the company suffered from the general industrial depression caused by the war and other factors. The earnings and expenses of the company for the fiscal year were as follows, compared with the previous year:

	1915	1914
Gross sales	$33,671,485	$43,733,646
Costs	31,109,074	39,016,423
Manufacturing profits	$2,562,411	$4,717,222
Other income	1,158,527	1,280,856
Total income	$3,720,939	$5,998,078
Interest	1,354,126	1,706,005
Depreciation, etc.	357,069	233,264
Total deduction	1,711,195	1,939,269
Surplus	$2,009,744	$4,058,809
Preferred dividends	279,909	279,909
Common dividends	1,427,350	1,405,989
Balance	$302,485	$2,372,911
Adj. credit	82,553	594,974
Previous surplus	7,659,130	7,348,522
Total surplus	$8,044,168	$10,316,407
Depreciation of inventory	.....	2,286,590
Miscellaneous deductions	570,757	370,687
Profit and loss surplus	$7,473,412	$7,659,130

The report says a further large reduction in the indebtedness of the company was effected during the year. Two issues of collateral notes aggregating $4,500,000 were paid off from the proceeds of the sale of securities. The six-year 5 per cent. notes, $425,500 issued in 1908, matured and were paid January 1, 1915.

In 1909 the Goodyear Tire & Rubber Company made 102,669 automobile tires. In 1914 the number had grown to 1,478,396. In the latter year the company used 1,325,259 lb. of paper, valued at $33,131.48, for shipping purposes.

Recent Progress in Corrosion Resistance*

Further Data Regarding the Effect of Copper in Steel as a Retarding Influence on Its Deterioration—A New Set of Tests

BY DANIEL M. BUCK

In an effort to combat the tendency of iron to return to its original (oxide) form when exposed to the action of air and water, much serious thought has been given by metallurgists and students of corrosion problems. We believe that all are agreed that the ideal condition is to so protect the surface of the ferrous materials as to permanently exclude the corrosive elements. To attain this Utopian condition, protective coatings of various types are used.

Inasmuch as no absolutely rust-proof steel or iron has ever been devised, the writer recommends that, wherever possible, construction materials which are to be exposed to corrosive influence be protected by a metallic coating, a suitable paint, or both. There are, however, conditions when such a protection is either not possible or not desirable, and it is also true that film coatings, on account of their liability to be removed by accident and abrasion, and by the action of the weather, are only a more or less temporary protection. Consequently, much thought has been given to the possibility of producing a steel or iron which in itself possesses corrosion-resisting properties.

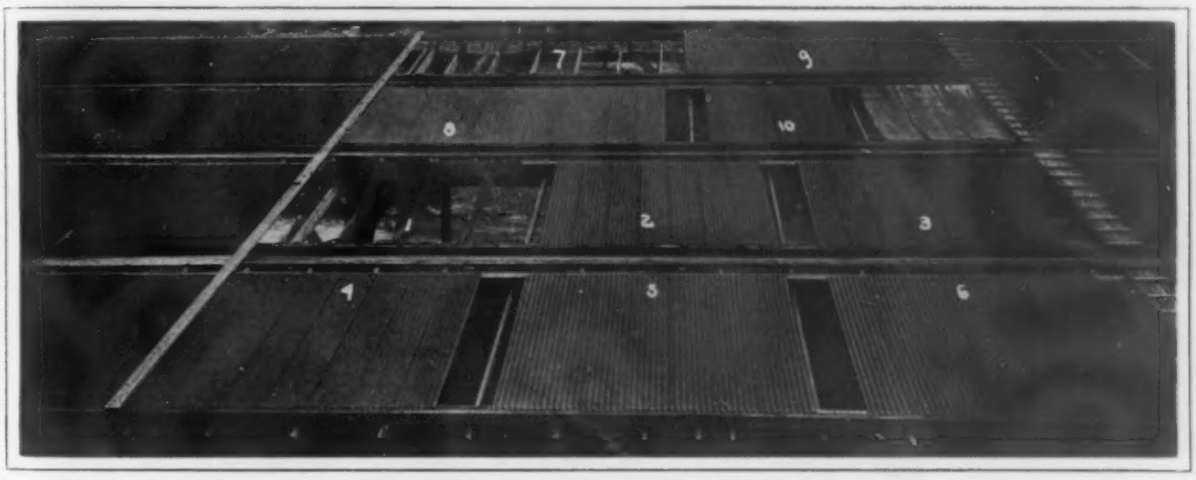


Fig. 1—View of the 16-In. Gauge Sheets Taken in February, 1915, After a Little More Than Three Years' Exposure in the Pennsylvania Coke Regions

DIFFERENCES OF OPINION

After years of research, investigation and practical experience, there is unfortunately at the present time not a complete unanimity of opinion on this subject. This difference of opinion is the result of several causes, some of which are avoidable:

An undue adherence to theory without practical demonstration of the value of the theory.

An undue and reprehensible adherence to a particular class of product in which the investigator may be interested financially or otherwise.

Placing too much confidence in accelerated tests.

Losing sight of the fact that under the best practices heats below the average are manufactured in all classes of products, and the consequent drawing of conclusions from comparing a good heat of one type with a poor heat of another type.

Drawing general conclusion from results obtained under peculiar conditions, which may or may not be in any way representative.

The adherents of the different schools are divided into four main classes as follows:

First.—Those who believe in genuine iron, the product of the puddling furnace.

Second.—Those who believe in normal mild steels, the product of the open-hearth and Bessemer furnaces.

Third—Those who believe in so-called pure irons, the product of the open-hearth furnace, in which the carbon and manganese are reduced to a minimum, and to which copper may or may not be added.

Fourth.—Those who believe in normal open-hearth and Bessemer steels with which has been alloyed a small amount of pure copper. Attempts have also been made to use nickel as the alloying element.

COPPER ALLOY STEELS

The writer, after many years of careful study and investigation, is one of the firm believers in the fourth type mentioned—copper alloy steels. Our investigations have dealt principally with the exposure and observation of full-sized sheets, unprotected in any way, under service conditions. Many different heats have been used thus eliminating the chance of accidental results. The majority of our tests have been made under atmospheric influences. We realize that it is impracticable to make tests under all of the many varying conditions, and believe that atmospheric corrosion is the most important, especially when considering structural material in general and sheets and plates in particular.

About five years ago, in testing the corrosion resistance properties of sheets made from electric furnace steel, it was noticed that one heat of steel which contained about 0.07 per cent. copper was markedly superior to the others in its resistance to corrosion. Some further work indicated that the results obtained were not accidental, and that the copper was probably the controlling factor. To remove the last element of doubt, several heats of both Bessemer and open-hearth steel were used and copper added in varying amounts to some of the ingots as they were poured, while to other ingots of the same heat no additions were made. Careful surveys of both the bars and sheets rolled from these ingots proved that the diffusion of the copper under these conditions was practically perfect. These ingots were rolled into 16-gauge and 27-gauge sheets and exposed to the atmosphere in the Pennsylvania coke regions, at Atlantic City, N. J., and along the Allegheny river above Kittanning, Pa., thus obtaining widely varying conditions of atmosphere.

A partial report of the results of these tests was made by the writer in a paper before the American

*From a paper presented at the Eighth General Meeting of the American Iron and Steel Institute in New York, May 28, 1915. The author is metallurgical engineer, American Sheet & Tin Plate Company, Pittsburgh, Pa.

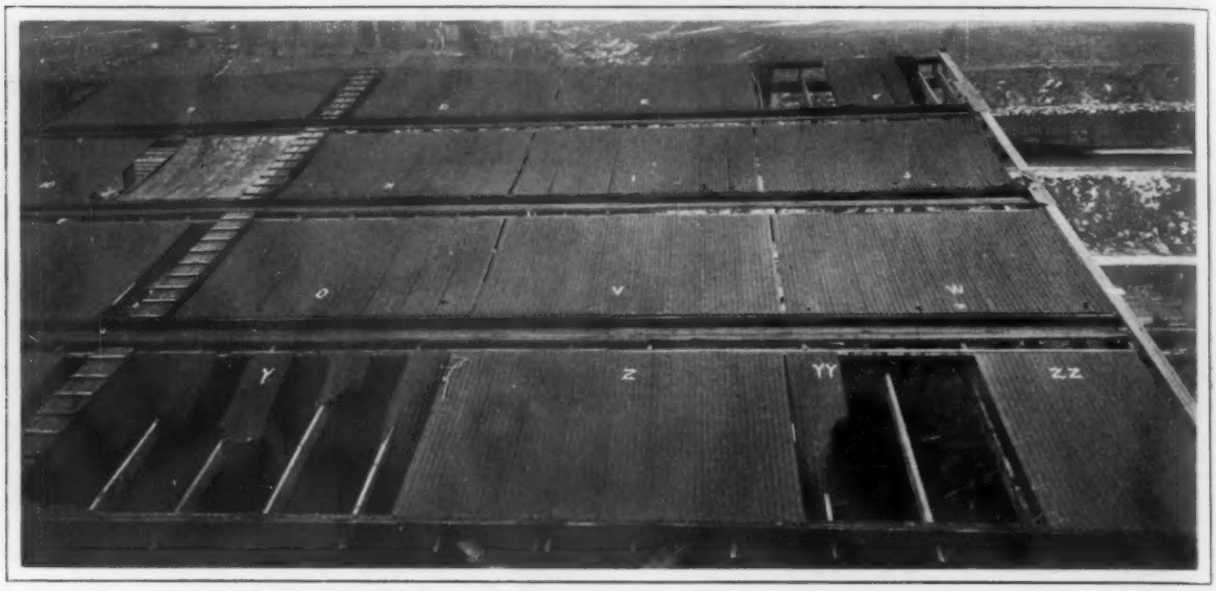


Fig. 2—View of a Second Series of Sheets Exposed in the Pennsylvania Coke Regions. Photograph Taken After 10 Months' Exposure

Chemical Society, in March, 1913. [Published in *The Iron Age* of April 17, 1913.] Of the 27-gauge sheets, after about seven months' exposure, certain of the panels, those to which copper was not added, had started to fail.

After about one year's exposure, the steel without copper had entirely corroded away, while the copper-bearing sheets from the same heats were in excellent condition. Fig. 1 is a photograph of the 16-gauge sheets taken in February, 1915, after a little more than three years' exposure. Two of the plain steels have absolutely failed, while the third, panel 4, which is re-phosphorized basic open-hearth, is in poor condition. The copper-bearing panels are, after three years' exposure, nearly as good as when first installed, and, so far as we are able to determine by observation, have not changed in any way in the past two years. Similar results were obtained at the other two test stations.

On March 4, 1913, a second series of sheets was exposed in the Pennsylvania coke regions, and Figs. 2 and 3 are photographs taken after 10 and 16 months, respectively. The remarkable inhibitive power of the copper content is strikingly shown in the photographs. Panels D, E, V, Z, and ZZ are copper-bearing steels. Panels Y and YY are plain open-hearth steels, without copper additions. Panel F is reworked muck iron, Panel I is a genuine charcoal iron. The table gives the analyses of the above-mentioned panels, and of the other grades H, O, W and J. It will be noted that the copper alloy steels have outlasted even the genuine iron sheets.

The writer, collaborating with J. O. Handy, is at present conducting a corrosion test in two different localities. In these tests are included 700 full-sized sheets of 44 different characters of steel. This test should be completed in approximately six months from the present date and will no doubt give us some additional valuable information which will be made the basis of a subsequent paper. In this series we have included copper additions in amounts from approximately 0.04 to 2 per cent., and we have also made additions of sulphur, phosphorus, aluminum, silicon, mill scale and steel turnings. Although the sheets have been exposed only about 10 months, and we have not yet completed our observations, we are already able to draw some interesting conclusions.

Figs. 4 and 5 show two sections of one of these test racks after about nine months' exposure. Panels 15

Fig. 4—A View of One Section of Test Racks Including 700 Full-Sized Sheets of 44 Different Characters of Steel. The Photograph Was Taken After About Nine Months' Exposure

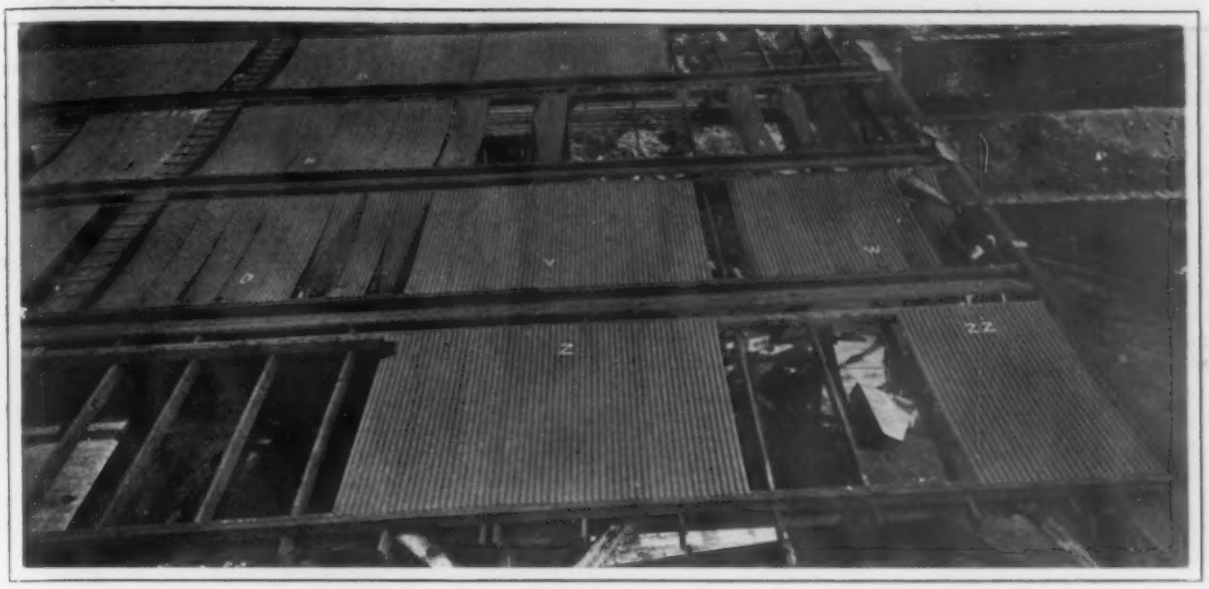


Fig. 3—View of a Second Series of Sheets Exposed in the Pennsylvania Coke Regions. Same as Fig. 2, but Photograph Taken After 16 Months' Exposure

and 16 are from the same heat of Bessemer steel, which carried 0.14 per cent. residual sulphur. Panel 15 has 0.25 per cent. copper, and Panel 16 has 0.008 per cent. copper. Panels 17 and 18 are from another heat of Bessemer steel with 0.052 per cent. residual sulphur; panel 17 being copper-bearing, panel 18 having 0.004 per cent. copper. It will be noticed that, considering the plain steels, panel 16 (high sulphur) has corroded much faster than has panel 18 (normal sulphur); while it is interesting to note that there is no difference discernible between panels 15 and 17, both copper-bearing. Up to the present time the sheets with high copper content, up to 2 per cent., are not showing any better corrosion resistance than those containing only 0.25 per cent.; and indeed, from present indications the beneficial influence of the copper content is quite marked down to at least as low as 0.04 per cent. copper. Panel 8 has silicon added and is failing badly, as are also panel 9 with aluminum addition, and panel 10 with a sulphur addition. As was expected, the addition of steel turnings to the molten steel has been of no benefit.

CONCLUSIONS

From our work to date we are prepared to draw the following conclusions as to the influence of the varying metalloids in steel sheets when exposed to the atmosphere:

Carbon.—Although there has been no attempt made to determine directly the carbon influence, it seems that in the low ranges present (0.02 to 0.14 per cent.) in mild open hearth and Bessemer steel, carbon has little influence.

Manganese.—While the writer is aware that some metallurgists advance the theory that a content of manganese is detrimental to steel in its corrosion resistance, we neither agree with the theories advanced nor have we observed the slightest evidence or proof that such claims are justified. Much the greater part of the manganese present in steel exists alloyed with the iron, in which form we would not expect it to influence corrosion as far as the electrolytic theory is concerned, since two materials differing chemically or mechanically are required to start electrolysis, and these conditions are not obtained by simple alloying. Some of the manganese unites with sulphur, forming manganese sulphide, which exists in isolated patches and which is at best only a feeble conductor of electricity, and as such should stimulate corrosion to only a slight extent, if at all. It is possible that these patches of manganese sul-

Fig. 5—Another Section of the Same Series of Tests Shown in Fig. 4. This Photograph Was Taken After About Nine Months' Exposure

phide, when they occur at the surface of the steel, or as they become exposed by the wasting of the steel, become oxidized to sulphates, in which form the efficiency of the moisture as an electrolyte would be increased. This action, however, is due to the presence of sulphur and not to the presence of manganese. Sulphur in steel must exist in combination, and if there is not sufficient manganese present, it will unite with the iron, forming iron sulphide, in which form it will be at least as harmful as in the form of manganese sulphide. Tests made by Burgess and Aston indicate that manganese alone in steel rather lessens than hastens corrosion.

Sulphur.—We are convinced that, of all the metalloids commonly present in steel, sulphur, especially when present in abnormal amounts, is the most harmful from a corrosion standpoint. Our experiments show that in non-copper steels as the sulphur increases up to 0.18 per cent. corrosion is hastened.

Table of corrosion tests on 2x4-in., 27-gauge test pieces. Exposed to weather for eight months at Scottdale, Pa. The results are the average of eight tests of each grade.

(Mill scale was removed from all samples before exposure, and all were cleaned with ammonium citrate solution before final weight.)

Grade		Analysis						Loss in oz. per sq. ft.	Rank	Relative losses, 100 equals greatest corrosion	Condition of test pieces after exposure
		Carb	Mang.	Sul.	Phos.	Sil.	Copper				
V	Bessemer	.04	.39	.078	.114	....	.31	3.15	1	42.63	No holes
E	Open-hearth	.04	.30	.043	.065	....	.31	3.24	2	43.84	No holes
ZZ	Open-hearth, unannealed	.11	.45	.049	.099	.011	.25	3.32	3	44.93	No holes
Z	Open-hearth, annealed. Same heat as ZZ	.04	.43	.049	.099	.011	.25	3.33	4	45.06	No holes
H		.042	.16	.024	.003	....	.21	3.39	5	45.87	No holes
D	Open-hearth	.06	.50	.037	.016	....	.26	3.50	6	47.36	No holes
C	Open-hearth	.06	.33	.035	.018	.	.25	3.51	7	47.50	No holes
O		.027	.67	.033	.007	....	.09	3.69	8	49.93	No holes
W		.049	.05	.043	.005	....	.10	3.88	9	52.50	Holes in two pieces
I	Charcoal iron	.03	.06	.013	.052	.039	.07	4.04	10	54.67	Holes in three pieces
J		.022	.03	.031	.006	....	.034	4.12	11	55.75	Holes in one piece
F	Reworked muck bar	.04	.07	.023	.134	.162	Trace	4.66	12	63.06	Few holes in all
YY	Open-hearth, unannealed	.11	.45	.048	.096	.007	Trace	5.11	13	69.15	Many holes in all
Y	Open-hearth, annealed. Same heats as Z and ZZ	.04	.45	.046	.099	.006	Trace	7.39	14	100.00	Only lace work left

Silicon.—Silicon in the small amounts normally present in open-hearth and Bessemer steels is innocuous. However, experiments made by adding silicon in the amount of 0.15 per cent. and 0.30 per cent. show that the corrosion rate is distinctly increased by silicon in these amounts.

Copper.—It is quite generally conceded that if copper is properly added to molten steel to the amount of approximately 0.25 per cent., the life of the steel under atmospheric conditions is greatly increased. While definite figures from actual losses on weighted test pieces indicate that this increased life is approximately 100 per cent., we are of the opinion that this figure is low. We have reached this conclusion from observations of copper-bearing steels after several years' exposure. It appears that the rate of corrosion of copper-bearing sheets lessens as the time of exposure increases, and that the loss during the first six months' exposure is greater than during subsequent periods.

Any unprotected iron or steel will develop to a thin film of rust in a few minutes when exposed to moisture and oxygen. This oxide film is electro-negative to the underlying metal and will stimulate further corrosion. Moreover, the physical characteristics and texture of this rust film are very important factors in governing the rate of corrosion of the metal. The rust formed on copper-bearing steel is dark brown, closely adherent and smooth, and if it does not really act as a protector to the underlying metal it is at least much less an accelerator than is the rust on a normal steel or iron, which is a limonite red in color, rough, loose and spongy in character. That the latter holds water to a greater extent is strikingly demonstrated by examining sheets which have been exposed for several months, both with and without copper, immediately after a rain. Copper-bearing sheets dry very quickly, while the loose, spongy rust on the sheets without copper holds the moisture for a considerable time, allowing corrosion to proceed for several hours after it has ceased on the copper alloy sheets.

While the beneficial influence of copper in steel and iron is most marked under atmospheric conditions, investigations under soil, water and other natural conditions are indicating superiority under these latter influences as well.

SUMMARY

To summarize conclusions from our work up to the present time: The influence on corrosion of carbon, manganese, phosphorus and silicon in the amounts normally present in properly made steels and irons is practically negligible. In a steel without copper, high sulphur content stimulates corrosion. A copper content of 0.25 per cent. materially increases the life of steel and iron, and the harmful effect of sulphur up to at least 0.14 per cent. is neutralized by 0.25 per cent. copper. More copper, up to 2 per cent., gives little, if any, additional benefit. Lesser amounts than 0.25 per cent. have great influence in lowering the corrosion rate. A content of 0.15 per cent. is in most cases quite as good as 0.25 per cent., and tests now under way prove that much lower amounts, down to as little as 0.04 per cent. and 0.06 per cent., while not giving the best results, are remarkably superior to normal steels carrying only the usual traces of copper.

Careful study is being made to determine definitely, if possible, the mechanism of the reactions which take place by alloying copper with steel and iron, and which will explain the remarkable beneficial influence of the copper content. We hope that this information will be available for a subsequent paper.

Discussion of Mr. Buck's Paper

BY DR. ALLERTON S. CUSHMAN

[Dr. Cushman was allowed 20 minutes in which to reply to Mr. Buck's paper. Below is an abridgement of his discussion.—EDITOR.]

Mr. Buck's paper has presented one side of a controversy which has been going on in this country for a number of years. With some of his introductory statements I am in complete accord, but I do not agree that it is unfortunate that these important questions should be debated and that all parties at interest should have a right to analyze and discuss conclusions based upon tests. It is my belief that, if these subjects under debate are finally settled, the court of last resort must be the unbiased consumer and not the producer of these various types of metal.

TESTING OF SHEET METALS A COMPLEX PROBLEM

The testing of sheet metals and wire to determine comparative resistance to corrosion is a complex problem in which many variables, some of them quite unknown to us, may play an important role. In my own experience of corrosion problems which have held my close attention since 1904, I have become convinced that tests, like statistics, can be made to prove almost any thesis which it is desired to prove. I am

not afraid to confess my own proneness to fall into this error, but I have attempted to overcome it, and I have become more conservative with regard to publishing results of private tests which have not been checked up by engineers representing the great consuming interests. Purely partisan evidence is not convincing, and I think one would be wise to reserve judgment in matters of controversy involving metallurgical conclusions of great moment until the evidence is all in.

If I understand Mr. Buck's purpose in the presentation of his tests, it can be boiled down to very simple language. We are asked to believe that the accidental occurrence in, or the deliberate addition of 0.20 per cent., more or less, of copper to any steel will confer upon it valuable properties in corrosion resistance, to the extent of increasing its period of usefulness many times over. In my opinion, Mr. Buck's tests on which he bases his conclusions are open to criticism both in their conduct as well as in the interpretation of the results obtained. I myself have under supervision quite as extensive and comprehensive tests of full sized sheets, corrugated and plain, which have been exposed for a longer period, and which differ widely both in results and in their interpretation from those presented here today. I have not as yet published these tests for the very reason that I prefer to await the conclusions to be obtained in tests in which the representatives of the consuming interests will have the predominating voice.

Since Mr. Buck has published and republished his own tests and has submitted his conclusions for discussion here, it is no more than just that I should be permitted to analyze his figures and conclusions.. In the tables, submitted in his paper, Mr. Buck has fortified his opinions by a group of results showing loss in weight determined on samples 2 in. by 4 in. in size. I believe such tests to be misleading since it is not the weight lost by a small sample or a number of small samples, but the way a given metal rusts under all possible conditions of service that must inevitably in the end determine the quality of a type. It is not only a possibility, but it is true that a section of metal which is pitting through very rapidly in segregated areas will lose less weight than one that rusts slowly and evenly all over.

ACCELERATED TESTS

Mr. Buck himself has warned us against placing much confidence in accelerated tests, but granting, for the sake of argument, that this method of presenting results has weight, why should not the conclusions have been checked up by independent engineers? The representative of a great consumer, J. L. Campbell, engineer of maintenance of way of a well-known railroad, conducted a comprehensive series of tests under varying conditions on a number of different types of iron and steel. They were conducted on test pieces 2 in. wide and 2 to 3 in. long. In four of the five series of results the coppered steels lost more weight per cent. in 12 months' exposure than the ordinary non-copper bearing steels with which they were compared. There exists a contradiction here which, before any fair-minded jury, would throw the entire data out of court as being inconclusive and unreliable.

In a table in Mr. Buck's paper the relative weight losses are not alone depended upon, but are checked up by counting the number of holes which appear after an 8 months' exposure of his test pieces at Scottdale, Pa. Now, if Mr. Buck's results as reported in this case can be repeated and checked up by unbiased investigators they would be of some weight, as no one wishes to buy sheet metal which in a thickness of 27 gauge is capable of being pierced full of holes or reduced to a condition of open lacework under weather exposure conditions in the remarkably short period of 8 months. Such results are astounding to me. I have had, among many others, 26-gauge samples of the most ordinary type of non-copper bearing Bessemer steel exposed under the atmospheric conditions of a densely populated mill town which has not as yet begun to combat the smoke nuisance, for 16 months before the first hole appeared in any of a large number of full sized corrugated sheets, in spite of the fact that some of my test sheets had been left in the original black, while others for comparative purposes had been first pickled in acid in the usual way. These results are shown in the illustrations, Figs. 1, 2 and 3.

In order to supplement these atmospheric corrosion tests I adopted the expedient of exposing similar sheets of different types of metal to a more severe test. This was done by bending up the edges of flat non-corrugated sheets so as to make of them shallow pans, which were filled with coal slack cinders and exposed in a horizontal position so that the rains could descend upon them. The results are given in the table. They are no more conclusive than Mr. Buck's tests. This point I wish particularly to emphasize. But it can be reasonably claimed that if the coppered basic steel was the best material among the great number of test pieces which I was investigating, they should have confirmed Mr. Buck's results.

Table of Cinder Pan Corrosion Test Results

Sheet No.	Material	Sul.	P.	C.	Mn.	Cu.	Ni.	Condition after 9 months
85	Bessemer steel	0.038	0.094	0.012	0.36	0.016	...	15 holes
108	Basic coppered steel.	0.028	0.008	0.10	0.19	0.26	...	6 holes
169	Pure basic open-hearth iron	0.020	0.004	0.012	0.008	0.032	...	sound
123	Pure basic open-hearth iron	0.029	0.006	0.012	0.023	0.024	...	1 hole
127	Open - hearth nickel alloy	0.020	0.007	0.010	0.037	0.036	0.16	5 holes
126	Open - hearth copper nickel alloy....	0.019	0.009	0.010	0.015	0.23	0.26	6 holes
170	Open - hearth copper nickel alloy....	0.027	0.006	0.010	trace	0.17	0.20	sound
121	Open - hearth high nickel alloy	0.024	0.004	0.010	0.015	0.028	1.00	sound

GROWING USE OF BASIC STEEL

I call attention to the fact that comparatively speaking the use of the acid-lined converter, both Bessemer and open-hearth, has decreased, while the growing use of the basic open-hearth furnace has led to greater refinement in steel products and, above all, a greater control of the elimination of harmful impurities in many types of metal. I have no hesitation in saying that, led by the extremely pure iron which it is now possible to manufacture in the open-hearth furnace, nearly all grades of steel are superior in rust-resisting quality to those which were offered 10 years ago. Products and brands are more standard, or less variable in analysis than they used to be. Also they are purer with respect to the well known impurities and better degasified, showing that our operating departments are taking more care with the products than was formerly the general rule. I make this statement quite independently of whether the presence of a small fraction of copper in steel is beneficial or whether it is not. Mr. Buck in his paper sounds the warning that the benefits he claims accrue only if the copper is *properly* added to molten steel.

If the tests under my supervision had indicated that copper was beneficial to carefully made pure basic metal, I should have advised the manufacturers of pure iron to put the copper in. The fact that it costs in some parts of the world at least more to keep copper out of steel than to put it in shows the easier way. In this respect, it is interesting to quote from J. L. Campbell's paper already cited, who says:

> Perhaps the most significant figures are those showing the relative corrosion of samples Nos. 2, 3 and 4, as they are of the same grade of steel, made by the same manufacturer, and are presumably identical in quality, the difference in copper content excepted. In regard to the addition of the copper we quote from the letter of the manufacturer, as follows:
>
> "In regard to the addition of copper, would say that the heats are made up as far as possible with copper scrap and any deficiency in the copper content is made up by adding the requisite amount of metallic copper to the bath in the open-hearth furnace about fifteen minutes or half an hour before tapping. The copper, therefore, has ample opportunity to become evenly distributed in the steel, particularly by the mixing action which takes place when the steel runs from the furnace into the ladle."

Fig. 1—A Photograph Showing the Scope of Weather-Exposure Tests of Sheets in a Manufacturing District

I believe that the real reason of any improvement which may have occurred in the effort to introduce copper as a normal constituent of steel lies in the greater purity, better degasification and decreased segregation of the modern material.

EFFECT OF EACH ELEMENT

I feel it necessary as a metallurgist to discuss Mr. Buck's statements under his separate headings.

Carbon.—A great deal of work has been done by a number of metallurgists in this country and in Europe in the study of the effect of carbon on corrosion resistance. Some authorities hold that carbon, in as much as it will allow hardening, will act as a protection, provided it is combined with the iron and uniformly distributed. As a matter of fact, however, it rarely is perfectly combined with the iron and uniformly distributed, as the microscope readily shows, and segregation in the cooling of impure molten metal is always an important factor. In our own practice we believe carbon to be deleterious on account of the fact that it is more difficult to properly degasify the metal while carbon is still undergoing oxidation in the process of burning out. I believe that Mr. Buck has followed a good example in limiting his carbon content from 0.02 to 0.14 per cent., with the accent on the minimum side.

Manganese.—I submit that in the production of pure iron the manufacturers do not aim to make material containing patches, and it is this very patchwork condition which existed in the older, segregated, carelessly made steel which has had our most earnest effort in the overcoming. As a matter of fact, corrosion is governed by a variable number of slight effects, all of which are important. Mr. Buck argues that this patchwork condition is due to the presence of sulphur and not to the presence of manganese. This is an ingenious truism such as the saying that it takes two to make a quarrel. I hold, however, that it is better to use the utmost endeavor to eliminate both the manganese and the sulphur, with the advantage on my side of the argument that it is an easier metallurgical accomplishment to effect the total elimination of manganese than the total elimination of sulphur. But Mr. Buck wants to eliminate sulphur to the highest degree possible, but does not want to eliminate manganese.

In his comprehensive book "The Corrosion of Iron and Steel," Alfred Sang, on page 84, states:

> Dr. Charles B. Dudley (for many years associated with the Pennsylvania Railroad), discovered, some years ago, that segregated manganese formed centers of corrosion, and it is a generally accepted fact that steels high in manganese are peculiarly liable to oxidation; if the proportion is small and uniformly distributed the effect is inconsiderable. The effect of manganese is corroborated by many reliable authorities.

Fig. 2—This Photograph Shows that Very Few of the No. 26 Gauge Test Sheets of Various Types of Metal Have Failed in 16 Months' Exposure in a Manufacturing District

It is true that he points out that if the proportion is small and uniformly distributed the effect is inconsiderable, but Mr. Buck bears witness to the lack of uniform distribution within his range and deliberately admits a condition of isolated patchwork. To my mind no further argument seems necessary.

Sulphur.—With regard to Mr. Buck's opinion about the influence of sulphur, I am glad to say that I find myself for once in complete agreement with him.

Phosphorus.—With regard to phosphorus, there are little accurate data as to its effect upon resistance to corrosion. I myself in a paper delivered before this Institute some years ago pointed out that nearly all the ancient irons which represent the survival of the fittest were remarkably pure with respect to every element with the single exception of phosphorus. However, I do not feel that any beneficial effect that it might possibly have has yet been proved in modern practice.

Silicon.—Mr. Buck claims that silicon present in the amount of 0.15 per cent. and 0.30 per cent. leads to a distinctly increased rate of corrosion. I am not prepared to question the accuracy of this statement; it is in effect but one more argument for purity.

Copper.—I do not concede Mr. Buck's statement, and there are a great many investigators who have published articles in the technical press of the world who agree with me. In addition to this there is a great body of perfectly unbiased investigators who feel that the point has not yet been proven one way or the other. I do not hesitate to state that no such claim is justified on any basis of unbiased evidence. Mr. Buck says: "We have reached this conclusion from observations of copper-bearing steels after several years' exposure." I may reply to this that we have reached quite the opposite conclusion and that we believe any improvement noted by Mr. Buck is due to a better degasification and less segregation than in the ordinary steels which he has been using for comparative purposes.

PHYSICAL CHARACTER OF THE RUST

The statement that the rust formed on copper-bearing steel is dark brown, closely adherent and smooth, is only partially true. I have noted a number of test samples of copper-bearing steel which showed just such an excellent condition as Mr. Buck refers to, but on the other hand I have seen a great number of specimens of copper-bearing steel, especially those made in the acid processes, which show the limonite red, rough, loose and spongy character of rust to which Mr. Buck refers. Almost invariably the pure irons as free as it is possible to get them from copper show the dark brown, closely adherent, smooth surface which seems to be characteristic of all properly degasified basic open-hearth metal. As a result of my observations of numerous tests extending over a great number of years I must emphatically disagree with the statement put forth by Mr. Buck covering this particular point.

Mr. Buck has stated that it is his belief that since copper is electro-negative to iron when it is properly mixed and incorporated with it, it reduces the tendency to corrosion by lowering the difference of potential between the metal and the loosely adherent rust or oxide. If this is true, why, may I ask, does not silicon also in the amounts of from 0.15 to 0.30 per cent. show a similar effect, since silicon is also a strongly electro-negative element? But as a matter of fact, as Mr. Buck claims, the addition of silicon in this range increases the tendency to corrosion. Such metallurgical arguments as these advanced by Mr. Buck cannot be accepted on their face, and when Mr. Buck sums up that the beneficial influence of copper in steel and iron is most marked under atmospheric conditions as well as under soil, water and other natural conditions, I must claim my right to utterly disagree with him not only from the standpoint of the theories he has advanced, but also as the result of close application to the study of numerous carefully planned tests extending over a number of years.

I submit that, in spite of the fact that we are all forced into undertaking weather exposure tests of uncoated sheet metals, such tests are irrational, inasmuch as no one yet uses any kind of iron or steel in an uncoated or unprotected condition, except in a few rare instances in which the conditions of service do not permit of protective coatings. If we are to make such irrational tests, however, I submit that the test pieces should not be pickled or sand-blasted or otherwise treated by special annealing or cold-rolling, or by any other method, but should go on test as nearly as possible in the condition that a prospective customer would be likely to buy similar sheets. If any other method than this simplest one is followed, a string of variables is introduced that could easily keep many of us so-called experts and our descendants arguing over the results until the crack of doom.

I submit also that 26 and 27-gauge sheets are too thin to yield fair comparative results under varying weather exposure conditions. I have never been able to get even the cheapest and most ordinary steel sheets to rust through in the same length of time in which Mr. Buck's best analysis sheets failed, although I have had them out under very severe conditions of exposure. I am therefore led to the belief that the tests described are not conclusive.

At my original suggestion, the Corrosion Committee A-5 of the American Society for Testing Materials is about to undertake a series of systematic weather exposure tests on large corrugated sheets of

Fig. 3—First Failure of a Common Bessemer Steel Sheet after Exposure to the Atmosphere for 16 Months in a Manufacturing District

16 and 22-gauge iron and steel of all types now available in the open market. These sheets are not to be pickled and only a portion of the heavier gauge are to be sand-blasted. Until these authoritative and unbiased tests can be reported on, it is my belief that such sweeping claims as Mr. Buck has made in his paper are quite unjustified. My own opinion, based on what I consider the most reliable data yet available, is that in metals, as in food, purity is the safest criterion of excellence.

GENERAL DISCUSSION

Under the five-minute rule several discussions of Mr. Buck's paper were submitted, some of them in manuscript. Space is not available for more than a resume of these.

James O. Handy

Mr. Handy, who is director of chemical laboratories of the Pittsburgh Testing Laboratory, presented the diagram given herewith showing losses in weight of the sheets which had been exposed in the coke region and at Pittsburgh. The plain steels lost heavily, as did also some open-hearth irons, while there was a marked diminution in the loss in the case of copper-bearing steels. He said in part:

"Mr. Buck's work has established beyond any question the superior corrosion resistance of low carbon steels containing copper. He has shown clearly that

either basic open-hearth steels or Bessemer steels are made more than twice as durable under weather exposure conditions by the addition of 0.25 per cent. of copper. In the course of experiments which Mr. Buck and I have made, it has developed that basic open-hearth steel containing as little as 0.04 per cent. copper is as resistant to corrosion as basic open-hearth pure iron containing the same amount of copper. This fact seems to establish beyond any question that copper is the controlling element in the corrosion of iron and steel.

"We feel certain that in some way the accelerating effect upon corrosion exercised by sulphur in steel is entirely inhibited by the addition of copper. The most probable theory is that copper unites with the sulphur and the copper sulphide dissolves in the excess copper, and the mixture dissolves in the steel itself. The sulphide of copper is not as readily oxidized as sulphide of iron or sulphide of manganese, and copper itself is extremely weather resistant. The steel, therefore, is far less readily oxidized than when the sulphides of iron or manganese are present in the steel.

"This suggests the idea that copper may now be intentionally and intelligently used to combine with sulphur in steel, and probably to add to the steel other valuable qualities beside corrosion resistance. The ideal, of course, is not corrosion retardation only, but corrosion prevention.

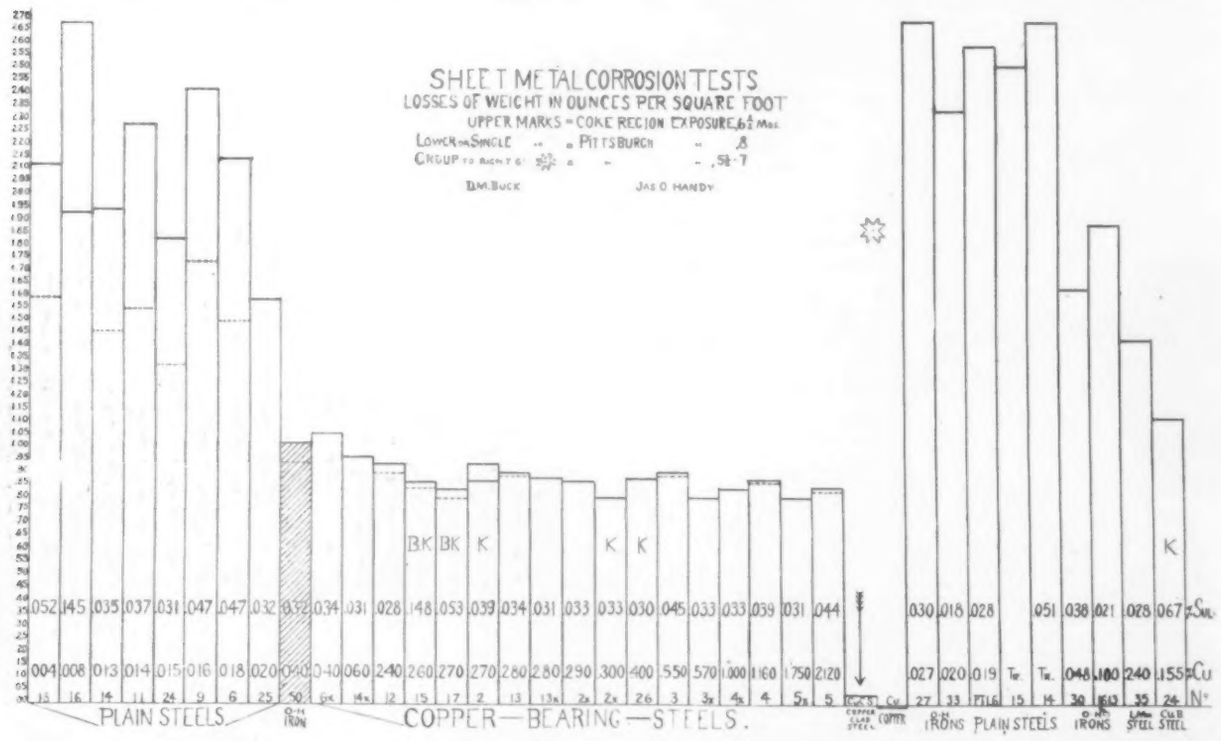
COPPER-COVERED STEEL HIGHLY RESISTANT

"Exposure tests made at the Pittsburgh Testing Laboratory have shown that copper and copper-clad or copper-covered steel resist the Pittsburgh climate perfectly. We find no material loss of weight after 18 months' exposure, while during that time all of the plain steels have disappeared, and open-hearth irons and copper-bearing steels have undergone large losses of weight by corrosion.

"Now that it has been shown that the electrolytic theory of corrosion does not prevent basic open-hearth irons low in copper from corroding as rapidly as common steel, and as it has also been shown that Bessemer steel high in phosphorus and sulphur, but containing 0.25 per cent. copper, is even more weather resistant than copper-bearing basic open-hearth pure iron, we ought not to be afraid to test rigidly the theory that copper-covered steel will corrode rapidly, because copper is electro-negative to iron. I refer to copper-covered steel in which the copper covering is welded to the underlying steel. Our own exposure tests show that such material is as durable as copper itself, except at sheared edges, and at these points there is no evidence of more than the ordinary corrosion of exposed steel.

"By the exercise of sufficient mechanical ingenuity in manufacture I feel sure that perfect copper-covered steel sheets can be made, and that they will be a very valuable material for the manufacture of roofing, culverts, etc.

"The illustration shows the great superiority in corrosion resistance of copper-bearing steels and open-hearth irons, when compared with plain steels or plain open-hearth irons. It also shows clearly that there is no material difference between plain steels and plain open-hearth irons containing less than 0.03 per cent. copper. Both materials corrode with great rapidity. The critical percentage at which copper begins to control the corrosion of steel is between 0.03 per cent. and 0.04 per cent. The difference is very striking. The corrosion rate is 100 per cent. higher in the case of steels or irons containing less than 0.03 per cent. copper, as compared with those containing over 0.04 per cent. It is shown graphically that in a more impure atmosphere the plain steels corrode much more rapidly, while the copper-bearing steels do not. The marked influence of sulphur on the corrodibility of the plain steels is shown most clearly.



"If Dr. Cushman believes, as he so earnestly affirms, that the nearer to pure iron his metal approaches the more rust-resistant it will be, let him make it with 0.02 per cent. copper or less, as one of his client's competitors has done, with the disastrous result shown by No. 27 in my diagram. He will find that the corrosion resistance of his metal has fallen below that of steel without copper."

William H. Walker, Massachusetts Institute of Technology

Mr. Walker referred at the outset to what he called the unwarranted assumption in the electrolytic theory of corrosion, that if there exists on the iron a speck of mill scale or any other electrical conducting material on which hydrogen can deposit easily, a tiny electric cell is set up and the electrolytic action proceeds at a rapid rate. The conclusion was that the purer the iron the freer it would be from such electrolytic poles, and therefore the slower it would corrode. It was found, however, that so-called impurities in iron and steel are not the active factors electrolytically they were once thought to be, and therefore eliminating these impurities has not brought the result which the theory at first led investigators to expect, since they considered part of the theory only.

"Our disappointment in the matter of results has, however, been relieved by the wonderful effects obtained by alloying with the steel a very small amount of copper. We have, for a number of years, carried on at the Massachusetts Institute of Technology a large amount of investigation work upon this copper-steel, both in the laboratory and in the field, and we can substantiate the results which Mr. Buck has obtained and has reported in his paper.

"I desire at this time to call attention to a factor of the electrolytic theory which has received almost no attention; that is the influence of the metal hydroxide which is formed, on the rate of corrosion. We find that the film of iron hydroxide or rust which forms on a plate of copper-steel is much denser, and depolarizes much more slowly than does that on any other type of iron or steel of which we know. In field tests this same phenomenon is observed. I have three plates which have been exposed to the weather on the roof of one of the buildings of the Institute of Technology at Boston for something over a year. They are all from sheets bought in the open market in Boston. No. 1 is a copper-steel containing 0.22 per cent. copper; No. 2 is a pure open-hearth iron and contains 0.04 copper; No. 3 is a piece of ordinary mild steel. The coating on the copper-steel is dense, closely adherent and depolarizes with great difficulty; that on the plain steel is yellow, loose and granular, and allows the surface of the metal to depolarize easily; the pure iron with 0.04 copper is obviously between the two."

John S. Unger

Dr. John S. Unger, of the Carnegie Steel Company laboratories, had visited the test roof at Atlantic City and also that in the coke regions referred to in Mr. Buck's paper. He found Bessemer sheets containing 0.1 phosphorus and 0.14 sulphur which had been exposed 10 months corroded into shreds. Sheets of Bessemer steel to which 0.25 per cent. copper had been added were in very fair condition. The coppered steel sheets would outlast the others three to four times. He found open-hearth sheets with phosphorus and sulphur under 0.04 but without the addition of copper which had not corroded as much as the Bessemer sheets. Similar open-hearth sheets to which 0.25 per cent. copper had been added showed about the same resistance to corrosion as Bessemer sheets made from steel to which a like addition of copper had been made. He agreed with Dr. Cushman that dependence could not be placed on accelerated tests. The real test is that in which full-size sheets are taken, as on a roof. Such tests had been made by Mr. Buck and he believed that the latter's tests were repetitions of actual practice so far as is possible.

G. H. Charls

Mr. Charls is general manager of sales of the American Rolling Mill Company. He spoke in part as follows:

"Co-operation should encourage a free discussion of questions on which there is a sincere difference of opinion, especially when such discussions enlighten and tend to raise the quality of American products. It is indeed very gratifying to observe that Mr. Buck has proved so conclusively in his table that No. 27-gauge pure iron has at least twice the life of steel. No one can justly accuse the author of this paper of being an ardent advocate of pure iron. This truth becomes more remarkable when you are informed that 27-gauge black pure iron is not even advocated by its producers because it cannot always be rolled satisfactorily. This is explained by the fact that pure iron is so soft, so ductile and welds so readily that the 27-gauge sheets stick fast together in rolling and are often damaged when torn apart.

"Due to the courtesy of Mr. Buck, a sheet taken from this lot which was to be tested came under my observation. In measuring the thickness of this sheet, it proved to be nearer 28 gauge than 27 gauge in many places, due to the difficulty of obtaining a uniform gauge in rolling such light material. It is therefore doubly gratifying to note the splendid record made by this light weight 27-gauge pure iron, pickled before it was tested to almost a tissue paper thickness, made under protest and against the advice of its producers and in every way unworthy of being considered a representative product by any fair-minded person.

"If under such adverse conditions pure iron outlasts steel two to one, it must be conceded that the claims made for this product have been thoroughly substantiated and sustained. This would be very welcome information to the thousands of purchasers of pure iron if they were not already aware of the intrinsic value of this product and its superiority to steel from the standpoint of resistance to corrosion."

Classification of Technical Literature

Delegates from about 20 national technical and scientific societies met in the United Engineering Societies Building, 29 West Thirty-ninth street, New York, May 21, to perfect a permanent organization, the purpose being to prepare a classification of the literature of applied science which might be generally accepted and adopted by these and other organizations. There was a generally expressed opinion that such a classification, if properly prepared, might well serve as a basis for the filing of clippings, for cards in a card index, and for printed indexes; and that the publishers of technical periodicals might be induced to print against each important article the symbol of the appropriate class in this system so that by clipping these articles a file might be easily made which would combine in one system these clippings, together with trade catalogues, maps, drawings, blue prints, photographs, pamphlets, and letters classified by the same system. By request W. P. Cutter, librarian of the Engineering Societies Library, and a delegate from the American Institute of Mining Engineers, read a paper on "The Classification of Applied Science" in which he outlined a plan whereby a central office could collate all the existing classifications, and, with the help of specialists in the various national societies interested, might compile a general system, which, although perhaps not absolutely perfect, might meet with general acceptance and adoption.

Permanent organization was effected by the election of the following officers: Chairman, Fred R. Low; secretary, W. P. Cutter; executive committee, the foregoing, with Edgar Marburg, H. W. Peck and Samuel Sheldon. The name adopted for this organization is "Joint Committee on Classification of Technical Literature," and the temporary address of the secretary, W. P. Cutter, is 29 West Thirty-ninth street, New York.

Finley P. Mount, receiver of the M. Rumely Company and its selling agency, the Rumely Products Company, La Porte, Ind., has received authority from the United States District Court to remove the assets of the company in Canada from liquidation and to transfer the Canadian claims against the company to the United States branch. Under the Canadian winding-up act the receiver of a bankrupt company is expected to liquidate its assets as soon as possible and to distribute the funds among the creditors. The action just taken is intended to protect the interests of the creditors more fully, as to follow the Canadian plan would injure the business of the company. The Canadian companies will be kept in operation and bond will be given to the Canadian court staying the proceedings there.

The Aviation Materials Company, which recently established a factory at Niagara Falls, N. Y., for the manufacture of metallic magnesium, said to be the lightest metal known, and considerably lighter than aluminum, has received a contract from the French Government for the entire output of the plant until the end of the present war. The metal, which is made by a secret process, will be used for the manufacture of aeroplanes in France. When the demand for metallic magnesium for war purposes ceases, the company proposes to manufacture the metal for household utensils and novelties as well as for aeroplane parts. George O. Seward, of New York City, is president of the company.

Judge Gary on Business Conditions*

Time Has Come for Business Men to Speak Plainly—Government Should Encourage Enterprise—Problems Coming After War Ends

There has recently been manifested a disposition to blame the business men of the country for not openly and vigorously protesting against influences which were calculated to prevent the natural and reasonable progress of economic effort. Men of prominence and recognized ability have stated in unmeasured terms that it is not only the right but the duty of the business men to boldly and persistently advocate their claims and defend their rights. They have been charged with undue timidity for neglecting to appeal to the sense and fairness of the general public whenever assailed without good cause.

That there has been some ground for these criticisms will not be doubted; but there is another side to this question. The business man has not been alone in his seeming cowardice. There are others largely responsible for the general conditions, and therefore under obligations to work for the advancement of the public interest, who have been reluctant to express their real convictions. Reference is made to some of the statesmen of prominence and ability whose disposition for fair play is unquestioned. On occasions when their voices, if heard in legislative halls, would seem to have been influential, they have remained silent.

In times gone by there have been reasons for the hesitancy of the business man in boldly proclaiming his rights. The conduct of business by many men (though small in number compared with the total) has not always been up to the standard of propriety. This is not a new subject; it has been frequently adverted to by many of us during the last ten years. As a consequence there has been considerable prejudice against business interests, particularly the larger ones; and it has been worse than useless to speak in favor of the protection and growth of business, for the words would be ineffective. So it is not difficult to understand why, for a period of years, business men in this country suffered in silence.

A CHANGE FOR THE BETTER

There is no intention at this time to modify or minimize anything that has heretofore been said by way of admission that there was need of reform in business methods. On the contrary, the fact should be emphasized that we must be honest and fair in our treatment of all questions submitted to our consideration and decision. But as I have said before more than once, there has been in this country a decided change for better business methods and, therefore, in the attitude of the general public toward the men in charge of business. There never was any such disregard of the rights of others by business men generally as was frequently charged. It has always been the effort of the large majority to be decent, but all suffered more or less for the misconduct of a few. However, in recent years there has been little cause for complaint; and the general public understands and appreciates these conditions.

Now the time is come when the business man, even if he represents large interests, may speak frankly and freely about any of the important questions which affect him or those whom he represents. When and while our attitude and conduct are above reproach, others will be willing to heed what we may say concerning any question in which they or we may be interested. Indeed, as heretofore suggested, the leading newspapers of the country have been fair and reasonable in their advocacy of whatever makes for the advancement of the economic conditions of the United States and in their opposition to the efforts of unwise or unthinking or vicious men to the contrary. What follows in my remarks will be said from the viewpoint of those who may be directly connected with and particularly interested in the consideration of economic questions.

The material strength and growth of the nation are of high importance. Food, raiment and shelter are absolutely essential to the life and health of the individual. This is interwoven with all other questions. A nation of individuals who are poverty stricken has little influence throughout the world. It cannot add much to the happiness of its citizens. If they are deprived of the necessities of life they will not listen long to the advocate of mere morals, nor to the speaker on the stump who seeks political preferment. It therefore behooves every one occupying a position of influence to give his best thought and endeavor to the promotion of business success in this country to the fullest extent consistent with propriety.

SOME REASONS FOR LACK OF PROSPERITY

With the advantages possessed by this country, on account of its location, climate, natural resources and immense wealth, it is not too much to insist that it should have been continuously more prosperous financially, commercially and industrially than any other nation on the face of the globe. Capital should have been protected, labor constantly employed at liberal wages, business enterprise encouraged, extensions and improvements continued without interruption, the wealth and population should have increased more rapidly and as a result all the people would have been happier and more contented and more generous toward each other. Moreover, the standing and influence of the nation throughout the world would have been improved. It is difficult to realize at this time what might have been accomplished if all the opportunities for reasonable success had been grasped.

But what can truthfully be said of business conditions in this country during the last ten years? Prosperity has often been interrupted; depressions have been frequent and severe; idleness has been noticeable and its results often distressing. Doubt, misfortune and fear have been prominent in business circles. Capital has been more or less timid and enterprise has hesitated. We have been the object of sympathy, and sometimes of ridicule, by the intelligent European financiers and economists. Words might be multiplied to illustrate the unfavorable conditions which have prevailed. It is true that various causes, some of which have been removed and ought never to have existed, have had a direct and important influence in producing adversity. This applies especially to conditions which the federal reserve act, recently passed by Congress and now in force, was intended to remedy. This act seems to be generally considered as sound and valuable even though some amendments may be needed.

ASSAULTS BY GOVERNMENT AGENCIES

The opinion is ventured that lack of continuous business prosperity and success in this country for a number of years has, in part, been the direct result of undue, ill-considered or unjustifiable assaults which have been made by governmental agencies or by the erroneous and unwise policies of different branches or departments of government. The results have shown to a demonstration that business success has not been fostered or encouraged as it ought to have been; that the vast possibilities of the country for increase in wealth have not been fully utilized. On the contrary, instead of trying to bring about co-operation between the Government and the people in a determined effort to better the conditions of all, there has been, in a substantial degree, an open hostility to business which has para-

*Extracts from address by Elbert H. Gary, chairman United States Steel Corporation, as president American Iron and Steel Institute, at the Waldorf-Astoria, New York, May 28, 1915.

lyzed many of its legitimate efforts. While, as heretofore admitted, there has been cause for complaint on the part of the Government, it is believed that few, if any, cases have been found which could not have been satisfactorily and properly adjusted by personal and friendly, though persistent, efforts without any open or advertised hostility which was certain to lessen confidence and to unfavorably affect large numbers in no wise connected with the matter in question.

It is not intended to be specific nor to do an injustice; but included in the terms used are speeches by men in office, the passage of laws that were discriminatory, and others that were unwise or insufficient, investigations by committees appointed by Congress and legislatures, and by various departments and bureaus of government, including grand juries whose services were brought into action on special occasions by the Department of Justice. Whether or not it is justified, there has been a feeling on the part of a large portion of the people of the United States, and also those of foreign countries, that there has not been a well-defined and persistent policy on the part of the Government to co-operate with and to promote the interests of the business man to the full extent reasonable; and on the contrary that the policy of some of the governmental agencies, both national and State, in their effect, at least, have been to interfere with, to delay and obstruct natural progress; to punish and destroy rather than to regulate and encourage.

GOVERNMENT SHOULD ENCOURAGE BUSINESS

The time seems to be opportune, first, to reiterate that the business men throughout the country must give no cause for complaint in the management of their affairs, but must continue to live up to the standards of propriety; and second, to insist that on those conditions the governments, with all their agencies and influences, shall co-operate with the business interests and aid them in establishing credit, in extending commerce, in increasing capacity, in the development of natural resources, in adding to the comfort of themselves and those with whom they may be connected and for whose welfare they are more or less responsible. If this shall be the recognized effort of the national and State governments, what can we not properly say of the value of our property, of our future prosperity, the position of our credits, the stability of good conditions and the standing of our nation? And this attitude on the part of governments, we believe the people of this country are demanding and have a right to demand; and they will not be satisfied with less.

Again, may we not claim there is ground for improvement in the business methods of the national, State and municipal governments throughout this country? There have been expenditures that were extravagant or useless, aggregating millions; unnecessary positions have been created, and the number of incumbents multiplied; money has been paid out for decoration and display and for entertainment and personal comfort that were not appropriate nor justified in a country like ours, which should set an example for economy and efficiency; appropriations have been made for local improvements in order to secure personal patronage; also to cover the expenditures of committees appointed by legislative branches and the departments of justice to pay for investigations, secret service, special counsel, etc.

Some day an enterprising newspaper will make such inquiry and examination as will enable it to publish, for the benefit of the reading public, the amounts of money which have been wasted by mismanagement, negligence or something worse. There is reason for beliving that the estimate made by the late Senator Aldrich, of the amount which could be saved annually by the Government of the United States if its affairs were conducted on a business basis, was conservative.

It is believed if the business methods of the United States Government and of its branches and departments were as careful and economical as those of many of the corporations whose presidents are listening to me at this time, hundreds of millions would be annually saved to the people of this country, portions of which are sadly needed for other necessary purposes. Is it too much to ask that hereafter there be elected as legislators and officials of power none except those who possess, with other qualifications, business ability?

NEED OF BETTER NATIONAL DEFENSE

In discussing questions relating to national expenditures none of us would advocate limiting the amount required to be paid for the protection of the country or the promotion of the welfare of the people. Disbursements of this character are not extravagant. We are rich, and by the continuance of a proper policy, the wealth of the nation will rapidly increase and we can, therefore, afford to expend whatever is actually necessary. This is true economy, and in the end results in a great saving of capital.

Apropos to this subject, it may be said we should create and maintain an adequate army and navy. We should especially maintain a better navy—one equal, at least, in every respect to that of any other nation. So far as the army is concerned, a large force of reserves, properly trained, with adequate supplies for use in times of emergency, such as General Wood and others advocate, would probably be sufficient. But we should be prepared at all times to protect our borders on the sea and also our commerce wherever it extends.

After the troubles growing out of the European war are over, there will be a general struggle, however good-natured, for export business. Our exports should materially increase, and large numbers of ships flying the American flag should be placed in service, and they will be if appropriate governmental encouragement is extended. Ownership by the government is not alluded to. We must not remain in a position which permits the navy of any other individual country to dominate the seas. Whatever the disposition and intention of the rulers of other nations or those in high authority may be, there would be occasions when arbitrary action by local officials coming in contact with those pecuniarily interested in a special question, precipitated by circumstances, might be very detrimental to the interests of an American merchantman involved. We have reached a position of great power throughout the world, and this will be even more potential if we are prepared physically to make good our assertions in favor of the fair treatment of all matters we are called upon to decide. We must demand and insure the right to transport our goods freely across the seas, and further that all seaports shall be kept open for the delivery and receipt of every merchantable commodity.

Our country must never provoke controversy nor act from selfish or immoral motives. We love peace and we hate war, but under present conditions, which it is to be hoped may speedily change, we must be prepared to defend our rights.

WHEN PEACE SHALL HAVE RETURNED

The business relations between the United States and foreign countries before and after the war are important to be considered at this time in connection with the paramount topic of the day, namely, the attitude which should be assumed and maintained by this country. The commerce between the United States and Austria-Hungary, Belgium, France, Germany, Great Britain, Italy and Russia in Europe for the five years ended June 30, 1914, aggregated $9,435,593,143, and the balance of exports over imports amounted to $2,293,623,483.

We would be dull of conception if we failed to comprehend the importance of these trade relations; and any act on our part which might tend to sever the connections, or any of them, or to interfere with their natural growth should be condemned as unworthy and unintelligent. For many years, we have been striving to cultivate a spirit of friendship and confidence with our brethren across the seas, because, among other reasons, we realize it is for our pecuniary benefit. This has been especially true of the iron and steel interests and, except for unreasonable and partisan criticisms, not necessary now to locate, much could have been done along legitimate lines to make further progress in the establishment of a permanent international basis of business friendship, which would be of advantage to all and of injury to none.

After all differences are adjusted, the nations now or to be engaged in this colossal conflict, though terribly crippled, will take a new start and in many respects a new course, and will begin immediately to build on a better and firmer and more permanent basis for success and high achievement in everything that adds to national wealth, power, energy and enterprise. These nations will not remain inactive or despondent or indifferent. We shall see the most active and persistent efforts to rebuild and extend and to succeed in the international race for supremacy that the world has ever witnessed. From adversity will come greater prosperity than ever before.

Now what should the United States prepare for? If we conduct our affairs properly, if we make the most of our opportunities, if we co-operate with one another, if the Government and governmental agencies and the business people are allies one with the other, we shall become stronger and richer and more potential in our influence, and we shall be able to take a place in the van of nations, progressing toward results more satisfactory than ever before. Much depends upon our management of affairs. There has never in the history of the world been so great a necessity for wise and disinterested statesmanship or for loyal and honorable conduct on the part of the practical business men as at present. Will we do our part?

WE MUST MAINTAIN OUR NEUTRALITY

It is to be hoped, and I think we may expect, that nothing will occur to disturb the international relations existing at the present time between the United States and each of the foreign nations. It is unthinkable that we should become involved in war with any of the foreign countries at this time. When the present combat shall have ceased we must be on a friendly footing with all the nations. If our financial and business conditions are such as we claim they may and ought to be, we may be profitable customers of each of the foreign nations, in supplying our necessities and comforts, and they in turn will patronize us. There will be, no doubt, vigorous competition and the foreign nations will do their utmost to secure and retain the trade of agricultural countries who are large importers of manufactured products. However, it is not active competition we fear, provided we are properly protected by our Government. All we need and all we ask is an open field and a fair chance, on an equal basis, to compete with all nations for a reasonable share of the world's business. We extend to the people of all foreign countries the hand of business friendship, and we ask for their friendship in return. And we ask for similar reciprocal relations between the leading political forces of the United States and ourselves to the full extent that we deserve. Competition with co-operation is desirable. Competition is, or should be, healthful; but co-operation, which benefits all concerned and injures none, is perfection of economic health and progress. Argument in favor of competition, without recognition of the principle of co-operation, is theoretic and academic, and is neither wise nor practical.

THE BUSINESS OUTLOOK

I will add a few words in regard to present business conditions. As you know, during the last three years I have not been especially encouraged as to the immediate future, but as to the long future I have been a consistent optimist, for reasons which have been given from time to time. Assuredly we may build our hopes and expectations on the opportunities which this country offers. It seems to me at the moment the outlook for improvement in our lines of activity are better than they have been for more than a year. This is undoubtedly in part the result of increased exportations at fair prices, due to the European wars, but in my opinion also because of a change in sentiment toward business, which now seems apparent. The captain of industry is again becoming popular in the United States, and this has been brought about by the efforts of business men to satisfy the public in regard to their reasonable demands. The individual, or aggregation of individuals, or the nation, whose standard of conduct conforms to the golden rule will on the average secure the largest pecuniary success. The clouds of distress, suspicion and hostility are breaking. In the rift we may see the sunlight of better things and better conditions.

In closing I quote from the speech of Mr. Robinson at Chicago in presenting for your consideration a design, afterward adopted by you as the seal of this Institute, the sentiments of which influence all of our deliberations: "In its detail this seal shows you the sword and the spear transfused by the alchemy of wisdom into the plowshare and the pruning hook. The crucible represents the birth of steel, the steel of war and the steel of peace; but these simply surround the central motif, the spirit of co-operation symbolized by the bird of immortality, the phoenix, rising from the ashes of discord, enmity and strife, into the rays of enlightened life. In its finality the seal, bound by the sturdy oak and wreathed with leaves of olive, forms, perhaps, a fitting laurel to the strength of unity and the gospel of co-operation."

New High Resistance Electric Pyrometers

The Bristol Instrument Company, Waterbury, Conn., has brought out a line of high resistance thermo-electric pyrometers for measuring temperatures up to 3000 deg. F. The instruments are intended for use either with the maker's base metal couples for measuring temperatures up to 2000 deg. F. and with standard platinum platinum-rhodium couples or maker's compound couples with platinum platinum-rhodium tips for measuring temperatures up to 3000 deg. F. The use of these couples for measuring temperatures as high as 3000 deg. F. is possible, as the resistance of the instrument is so high, compared with that of the standard couples, that the change of resistance in the latter is an extremely small and negligible percentage of the entire resistance of the circuit. Two types of instruments, one for mounting on the switchboard and the other a portable one, are made, zero adjusting devices being provided for both types. These are relied upon to give a simple and rapid adjustment for different cold end temperatures and the movements are of the pivot jewel bearing type which it is emphasized is unaffected by the ordinary vibrations in shops.

Production of Coal Briquettes in 1914

A substantial increase in the quantity of coal briquettes manufactured and sold in 1914 is announced by the United States Geological Survey. A tendency to operate in large units is illustrated in the statistics, the smaller and experimental plants going out of existence and the new enterprises being of greater capacity. The production in 1914 amounted to 244,635 net tons, valued at $1,123,178, an increase compared with 1913 of 62,776 tons in quantity and $115,851 in value. This shows the greatest activity in coal briquetting in the history of the industry.

Of the 15 plants in operation during 1914, five used anthracite culm as a raw material; two, semi-anthracite; one, bituminous slack; two, a mixture of anthracite culm and bituminous slack; two, petroleum residuum; two, semi-bituminous slack, and one, a mixture of anthracite culm, bituminous slack, coke and lignite.

The Laclede Gas Light Company, St. Louis, lighted its by-product coke ovens May 21, the plant having been completed to the point where the first unit of 56 ovens, with a daily consumption of 1000 tons of coal and output of 700 tons of coke, could be put in operation. The plant is equipped to turn out daily 7000 gal. of coal tar, 2000 gal. of benzol, 5000 lb. of crude ammonia, and 11,000,000 cu. ft. of illuminating and heating gas. About one-third of the gas output will be utilized in the ovens in manufacturing the coke.

The Ferguson Steel & Iron Company, Buffalo, is building an addition to the office and drafting room at its fabricating plant and installing more equipment required to care for increasing business.

Steel Men Look Forward to Better Things

A Note of Hopefulness at the New York Meeting of the American Iron and Steel Institute—Technical Papers

The eighth general meeting of the American Iron and Steel Institute, held at the Waldorf-Astoria, New York, on Friday, May 28, was more noteworthy than any of its predecessors for the address of its president, Judge Elbert H. Gary, while the technical papers were well up to the high standard this remarkable organization has set. There was an attendance of 450. If some faces that have been made familiar by previous meetings were missed, there was a larger number than at any other, of members who were making their first appearance.

In making up the programme the long-standing committee on arrangements, working in co-operation with Secretary McCleary, departed from custom in providing a smaller number of papers—there were five at the two day-time sessions of Friday—and making provision for five-minute discussions. The change worked well, and now that the ice is broken more discussion from the floor may be expected hereafter. All the five papers referred to were technical. In the earlier days commercial subjects were given almost equal prominence. But that side of the business is far less prolific of new issues than the operating side; in fact, the old standby, contract obligations, has about the same status as a problem, that existed when it first came before the institute.

President Gary's address was generally commented upon as the best he has delivered, and in so saying comparison is made with a series of notable papers. For several years Judge Gary's semi-annual deliverances at these meetings have been looked to as in a large measure both reflecting and giving direction to sentiment in the steel trade. But their expressions have been very guarded and the author has manifestly been hampered by the delicacy of his position and the magnitude of the interests involved in pending litigation. His address of Friday came nearer than its predecessors to declaring the whole counsel of his mind on the questions discussed, and there was unstinted approval of its vigorous utterances on government and business. There was also quite general agreement with Judge Gary's hopeful expressions concerning the future. The opinions exchanged by the members on the business outlook were more cheerful than have been heard at these meetings in nearly two years.

An important feature of the banquet was the excellent suggestion of Edward M. Hagar that the institute undertake a propaganda for the extension of the uses of steel, in the way that has been done with such good results by the manufacturers of cement.

Nearly every seat in the Astor Gallery was occupied when Judge Gary called the meeting to order shortly after 10 o'clock. The reading of his address occupied nearly an hour. It was listened to with the closest attention, and now and then a particularly striking utterance drew applause. It was the longest as it was in many portions the most carefully wrought out of Judge Gary's presidential addresses, taking on the stature and force of a state paper. It was evidently gratifying to the leaders in the industry to have Judge Gary speak with plainness concerning some of the reasons for the country's lack of prosperity. They agreed with him, too, in what he said as to the change for the better in the opinion of the general public concerning business men and business methods. Warm applause followed this utterance concerning the position of the United States in international affairs: "We should keep the olive branch extended in front so long as possible, but when it is smitten from our hands without cause or provocation by a hostile power that seeks to destroy us we should be prepared to protect ourselves, and this promptly and continuously, so long as present methods are in vogue."

FRIENDSHIP FOR FOREIGN STEEL MANUFACTURERS

The address laid emphasis on the commercial relations of the United States and foreign countries. The total business between United States and the European countries now at war in the five years 1910-1914 was $9,435,593,000 and the excess of our exports to these countries over our imports from them in the five-year period was $2,293,623,000. In this connection, referring to the efforts made by the steel manufacturers of the United States to cultivate friendly relations with manufacturers abroad, Judge Gary said:

> For many years we have been striving to cultivate a spirit of friendship and confidence with our brethren across the seas, because, among other reasons, we realize it is for our pecuniary benefit. This has been especially true of the iron and steel interests and, except for unreasonable and partisan criticisms, not necessary now to locate, much could have been done along legitimate lines to make further progress in the establishment of a permanent international basis of business friendship, which would be of advantage to all and of injury to none. It is sufficient to say that our trade with foreign nations has been increasing, with prospects for more rapid and larger advances and with the expectation of the balances in favor of the United States becoming augmented from year to year. I do not, of course, refer to the volume of business at the present time, for it is abnormal.

COMMENT ON THE PRESIDENT'S ADDRESS

In line with the rule adopted for the meeting, providing for informal discussion of all papers under a five-minute rule, Judge Gary asked for criticism of his own remarks. Willis L. King in responding agreed that business men had been remiss in the past in not boldly contending for their rights and in not participating in public affairs. If he had any criticism to offer on the address, it

would be that the president had taken a less optimistic view of the future than was warranted. He considered the conditions ripe for an early resumption of business on a large scale. For the first time in our history we have the world for a market and he believed American manufacturers would retain many of the markets they are now taking. "Financial conditions are favorable; there is promise of abundant crops, perhaps the largest in the country's history, and steel manufacturers have every reason to be very optimistic."

Papers and Discussions

The first paper of the day was on "Blast Furnace Advancement," by Andrew E. Maccoun, superintendent of the Edgar Thomson blast furnaces of the Carnegie Steel Company. Portions of the paper will appear later in *The Iron Age*. It was discussed at some length by A. N. Diehl, blast furnace superintendent of the Duquesne works of the Carnegie Steel Company, who brought out prominently the point that the blast furnace advance in recent years had been made in spite of the fact that raw materials were inferior to those available in earlier years.

Jerome R. George, chief engineer of the Morgan Construction Company, Worcester, Mass., read a paper on "Merchant Rolling Mills," which admirably reviewed the developments in that important department of the steel industry. The paper will appear in full in our next issue. Few men are as competent as Mr. George to deal adequately with this subject. Three papers were presented at the afternoon session: "The Commercial Production of Sound and Homogeneous Steel," by Edward F. Kenney, metallurgical engineer of the Cambria Steel Company; "Waste Heat Boilers," by Charles J. Bacon, steam engineer of the Illinois Steel Company, South Chicago, Ill., and "Recent Progress in Corrosion Resistance," by Daniel M. Buck, metallurgical engineer of the American Sheet & Tin Plate Company. The last of these, together with the discussion upon it, appears in quite full synopsis on other pages. The paper of Mr. Bacon on "Waste Heat Boilers" will be printed in a later issue, as will also a synopsis of Mr. Kenney's paper. Mr. Kenney gave details of the practice followed by the Cambria Steel Company in meeting the 1914 rail specification of the Pennsylvania Railroad. Inverted ingots equipped with sinkheads were used, and out of 5000 tons of rails made from such sinkhead ingots there was only one case in which the segregation was sufficient to cause rejection.

Mr. Bacon's paper was discussed by R. E. Lewis, assistant general superintendent of the Saucon plant of the Bethlehem Steel Company, and by D. S. Jacobus, of the Babcock & Wilcox Company. The latter referred to the remarkable results in evaporation secured from waste heat boilers. Running at 200 per cent. of rated capacity an evaporation of 6 lb. of water per sq. ft. of heating surface had been secured, the gases being discharged at a temperature of less than 400 deg. F.

Professor Howe on Sound Ingots

Prof. H. M. Howe, Columbia University, in discussing the paper of Edward F. Kenney, said:

Let us hope that this discussion will make it well, surely and publicly known that both those who decide the procedure in rail making and also their advisers are very keenly alive to their grave responsibility to travelers; that familiarity has not dulled them to the appeal of every victim of a rail breakage to leave no effort unmade to shield others from a death like his; has not clouded their perception that the rail maker who contributes to a human death by failure to do what lies in him to prevent it by exercising his power, his knowledge, his skill, and his inventive faculty, is to that extent accountable for that death.

The danger to life from the use of our common pyramidal and cold-topped rail ingots has been so long and prominently before us that we turn eagerly to Mr. Kenney's most promising plan for avoiding it. His reason why wild steel segregates is certainly attractive; the supposed entraining upward of the metal alongshore, enriched in the segregating elements, and the resultant concentration of those elements in the upper part of the axis. Yet on reflection we do not find this wholly satisfying. This lively movement ought to stir the metal up, to efface rather than to cause local enrichments. The lightness of these elements hardly counts. A spoonful of whisky, if set skillfully on the surface of a glass of still water, indeed remains in place pretty well. But stir the water ever so little and the whisky mixes with it and can never again be parted from it by any mechanical means.

LANDLOCKING SOLIDIFICATION

I incline to explain the freedom of quiet steel from segregating in a radically different way, by its leading to the landlocking type of solidification. We conceive of two extreme types of solidification: the onion type, with the deposition of successive concentric layers one on another, and the landlocking type, by the outshooting of branching pine trees from the shores of the already solid layers. These outshooting pine trees lock between their trunks and branches the residual molten metal, with the result that each little pool thus trapped retains the whole of its carbon, phosphorus and sulphur, and no general migration thence of any part of these elements to an axial last freezing pool is possible. Thus it is easy to understand why this landlocking type of solidification opposes axial segregation.

Quiet leads in two ways to this landlocking. The first particle of iron which freezes out is much poorer in carbon than the molten metal from which it freezes and this selection, of course, makes the shore layer of the remaining molten metal correspondingly richer in carbon than it was before the freezing began, and probably so rich that its freezing point is higher than the existing temperature. As a result this shore layer cannot freeze, and no additional iron can freeze out of the molten and attach itself to the already formed solid layers till, by the slow process of diffusion, the layer of the molten in contact with them has become so poor in carbon that it can freeze at the existing temperature.

If, now, we imagine that two pine tree trunks have already formed and are projecting out into the molten, it is evident that this process of diffusion will lower the carbon content of the molten metal in contact with their tips more rapidly than that of the landlocked metal between their trunks, so that their tips will grow faster than their sides. But this is a condition which continuously exaggerates itself. The longer the trunks of the pine trees are the more effectually do they shut off the molten metal about their bases from being so impoverished in carbon by diffusion as to become capable of freezing at the existing temperature.

This principle, which thus leads to the rapid growth of the pine-tree tips, has already led to the formation of the pine trees themselves. Any slightest protrusion at any one spot on the surface of the solid layers at their contact with the molten has a corresponding advantage over the concave spaces about it. Because it protrudes it will the sooner have molten metal against it on which it can feed, that is to say molten metal poor enough in carbon to be able to freeze at the existing temperature. Hence from being a slight protrusion it grows rapidly into being an outshooting blade. Because it thus grows faster than the concavities beside it, it continuously increases its advantage. To him that hath shall be given.

RESULTS OF RAPID MOVEMENT

But this advantage which the first incipiency of a protrusion has is in large part lost if the metal is in rapid movement, because this movement feeds the concavities beside the protrusion almost as fast as the protrusion. The advantage which a protrusion has is

very great if diffusion alone is to remove the carbon of the shore layer of molten metal which is unfreezable because too rich in carbon. But if there is violent motion, as in rising steel, this feeds the valleys almost as effectively as the hills, the sizes of the pine trees almost as effectively as their tips.

Clearly, if solidification is very rapid, as in the case of narrow ingots, or in case the steel is cast so cool that it stores up little heat in the mold walls, or if those walls themselves are so massive that their temperature is raised but little by the heat which they receive from the steel, then the advantage which protrusions have is proportionately greater, especially if the metal is quiet, so that the supply of freezable metal has to come through diffusion only. Hence the less segregation under these conditions.

This brings us to a special way in which quiet opposes segregation. Quiet metal often cools far below its true freezing point before freezing actually starts. But once started it goes on with extraordinary rapidity. And this rapidity, by exaggerating the advantage which every incipient protrusion has, leads to great landlocking and thereby opposes segregation.

Election of Officers

At the noon intermission the annual meeting of the board of directors of the institute was held and the officers were re-elected. They are as follows: President, Elbert H. Gary; First Vice-President, Powell Stackhouse; Second Vice-President, Willis L. King; Third Vice-President, Charles M. Schwab; Treasurer, Edward Bailey; Secretary, James T. McCleary.

A number of persons were elected to membership. In an informal way the place of the October meeting was discussed, but there will be no decision until the June meeting of the board. Cleveland and Buffalo have been talked of, Youngstown having waived for the time being its request of one or two years' standing.

The Annual Dinner

At the banquet of Friday evening, following a custom that has been observed at most of the New York meetings of the institute, a paper was given dealing with welfare work. On this occasion Dr. Lloyd Noland, superintendent of the health department of the Tennessee Coal, Iron & Railroad Company, described most interestingly the work of that company in caring for the health of its employees and in making its various mining camps more desirable places to live than have ever been provided at industrial operations in the South. Lantern slides were used and there was frequent applause as new and old conditions were shown, making possible an estimate of the vast change for the better.

A UNIQUE WELFARE SYSTEM

Dr. Noland considered welfare work in its broadest sense—the conservation and upbuilding of health and strength, both physical and moral, among employees. About 15,000 men are employed in the operations of the Tennessee Coal, Iron & Railroad Company, over half of whom are negroes. About 34 per cent. of the employees live in houses owned by the company, and of these 65 per cent. are negroes. In turn the speaker took up the sanitary, medical and welfare divisions of the work of the health department. The sanitary division looks after the purity of water supply, care of closets, collection of garbage, cleaning and draining of streets and alleys, elimination of mosquitoes, inspection of stables and disposal of stable manure for fly prevention, isolation and quarantine of contagious diseases, supervision of milk supplies, also inspection of commissaries to insure purity of food supply. The company properties are divided into six sanitary districts.

The medical division takes care of 20 districts, each in charge of a physician. There are 35 doctors and 15 nurses. Their duties include physical examination of all applicants for employment, physical examination of school children and inspection of schools, co-operation with the sanitary division in general health work, and care of all sick and injured employees and their dependents without regard to the nature of the illness or whether injury was received in line of duty. There are two base hospitals of 18 and 26 beds respectively, six smaller hospitals and 12 dispensaries. The laboratory of the medical division reported in 1914 on 3696 specimens of all kinds examined. In the same year there were 129,551 applicants for treatment at the dispensaries and 84,621 calls were made at the homes of employees.

The welfare division has charge of club houses in various towns; the conduct of courses in cooking, sewing, and housekeeping for school children and adults; kindergarten instruction; home visiting and instruction by social workers and school teachers; supervised play at playgrounds and schools; also supervision of various organizations, such as boy scouts, camp fire girls, mothers' clubs, etc.

Closely associated with the department of health is the company's educational department, which has charge of the operation of all company schools. These schools, 24 in number, are maintained or partly maintained by the company in co-operation with the county, and are divided into 12 schools for whites and 12 for negroes, with a total enrollment of 3311 pupils under the charge of a superintendent employed by the company.

The results of the splendid organization and well directed efforts of the Tennessee Company, as well summarized by Dr. Noland, brought out a round of approval from his hearers. The results of instruction in home hygiene and in housekeeping arts was most gratifying. School teachers and welfare workers reside in cottages which serve as an example to the women of the community of how houses should be kept and run. Churches are provided for every community and much is accomplished through church and Sunday school work. Kindergarten instruction prepares the child for regular school and relieves the mother of its care in morning hours. Playgrounds are provided for children, and baseball and football fields for men. The schools are well attended and their standard is being improved. In conclusion the speaker said: "If our efforts are successful there will be developed in the Birmingham district a generation of healthy, sober and industrious men and women, adequately equipped to realize and to perform their duties to the community, to their employers and to themselves."

TRIBUTES TO THE INSTITUTE

Judge Gary called on a number of the banqueters to speak. Joseph G. Butler, Jr., Willis L. King and John A. Penton paid tribute to the growing influence of the institute, which in some directions they considered beyond computation. Mr. King spoke of the friendships that had been cultivated in connection with the meetings of the institute, of the mutual respect engendered, and of the standards of business practice it had helped to maintain. Mr. Butler commended the president's address of the morning, and referred to the far-reaching in-

(Continued on page 1264)

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The American Iron and Steel Institute

It is doubtful if the influence of the American Iron and Steel Institute is appreciated even by those who have most to do with its affairs. It holds two meetings a year, attended by some 500 representative men of the industry, including the heads and other officers of practically all the steel companies of the country. At these meetings an address is made by the president, discussing the business outlook and important developments, legislative, economic and commercial, bearing upon the iron and steel trades, and papers are read, chiefly on progress in manufacturing practice. The institute collects and publishes the statistics of iron and steel production in the United States and at intervals compiles a directory of the industry in all its branches. A monthly publication is maintained, which thus far has been devoted largely to the betterment work of the iron and steel companies.

Such a list of the functions of the institute fails, as would even a more detailed one, to give any adequate idea of what it has done and is now capable of doing for the American steel trade. It is unlike the great engineering societies in having the direction of its affairs in the hands of the heads of large corporations. That came about, as is well known, from the fact that when the institute was formed the purpose was to have it deal chiefly with the commercial side of the business, with the vastly important questions of supply and demand, of markets, and of trade practices which would best conserve the interests of producer and consumer under prosperity or the reverse. Political conditions and the familiar developments of the past half dozen years have made the institute practically inactive in these latter directions, apart from the reading of an occasional paper on contract enforcement or a kindred topic.

But the unique gathering together in one organization of the heads of the steel industry and more than a thousand of the strongest men in its operating, selling, fiscal and traffic departments has done for the whole trade what no catalogue of the institute's formal activities could express. It has made friends of competitors and instead of suspicion and ill feeling has created confidence and regard. It has raised the standard of practice, both in manufacturing methods and the treatment of customers. It has advanced the interests of employees by bringing all wages and the voluntary benefits into which employers are putting more money every year, nearer to those of the most liberal corporations. The contacts it has made possible to the younger men with the leaders in the trade have been a stimulus to those who are looking forward to careers of leadership.

No one who has watched the growth of this organization—movement one might better say—can help being profoundly impressed by the spirit that has actuated it, that has spoken out in its policies and in the utterances of its chief men. We have heard something from a high source, of a psychological factor in business that is presumed to have worked against confidence and recovery. The greatest achievement of the American Iron and Steel Institute is psychological, but the psychology has been constructive, co-operative and inspiring.

The question will be asked, How will the American Iron and Steel Institute give practical effect to this spirit which it has created and fostered? None of the work that is now so well done should be discontinued. But new occasions teach new duties. Now that every interest but that of the business man has been taken care of by legislation, and to an extent at the expense of business, there is a willingness, even an anxiety, not only to have business work out its own salvation, but actually to aid it by some real unshackling. The adjustment of the activities of the institute to this new disposition of government presents interesting problems.

Unquestionably there are large possibilities in the suggestion made at the dinner of Friday night that the institute undertake a propaganda for extending the uses of steel—a work that has yielded large returns in the cement industry. Also, as the prime mover for the Brussels conference of 1911, the institute might well be instrumental in bringing about some form of international organization, after the hatreds of the great war have exhausted themselves. In view of the striking of all names of German and Austrian members from the rolls of the Iron and Steel Institute at London last month, the American organization is the only one about which such an international movement could rally.

It remains to speak of the form of co-operation in respect to markets, which was regarded as the great object of the institute when it was formed. The Federal Trade Commission has begun its work, but the Sherman law stands unchanged. The main objection to the form of co-operation the steel manufacturers practiced in regard to prices in the two years following the panic of 1907 was that the con-

sumers' interests were not directly represented. No matter how fair the producer aims to be, he cannot represent both himself and the buyer in deciding what is the right price for his product. Whether the Federal Trade Commission will help in finding the way to a better form of co-operation, but having the same end—the bringing back of profits and stability to steel manufacture and to the industries which are consumers of steel—is a question for whose answer the steel trade looks with expectation.

The Ferromanganese Outlook

It is impossible to determine whether the recent advance made by the English producers of ferromanganese from $88 to $100, our seaboard, is based upon definite knowledge that the cost of production is likely to increase by some such amount, or is merely a precautionary measure. One cannot tell whether there is danger of its becoming impossible, rather than merely expensive, for the English makers to secure sufficient supplies of manganese ore.

In the American steel trade there is certainly less uneasiness over the ferromanganese situation than was the case only a few weeks ago. There are two facts: That shipments are considerably heavier on the older contracts, and that the producers have advanced their quotation $12 a ton. The steel trade seems to have taken more interest in the first mentioned fact than in the second. It is very important to consider the advance in prices, however, for if it is the fact that any large part of the advance is predicated upon the cost of carrying the ore, a price of $100 for ferromanganese suggests that ore has become very expensive. Roughly speaking, the ores used in England probably involve two and a half to three tons to a ton of alloy, and ferromanganese has advanced altogether about $60; if this is allotted entirely to ore it means over $20 a ton.

There is no doubt that the United States was comfortably fixed with alloy or ore at the beginning of this year and it may even be that stocks are now but little if any below normal. A rough analysis of the situation as to stocks can be made. Observing that the manganese ore imports were much larger in 1913 than in 1912, while our production of the alloy was smaller, it is evident that stocks of ore accumulated during 1913 beyond what they may have been at the beginning of that year. Taking January 1, 1913, as a basing point, the production of ferromanganese in 1913 and 1914 has borne the same relation to the manganese ore imports as obtained during the five years preceding, from which it may reasonably be inferred that the stocks of ore in the United States at the beginning of this year were approximately the same as two years earlier, when they presumably represented a fair tonnage.

The supplies of ferromanganese in 1914 included 106,083 tons domestic production and 82,217 tons of imports, a total of 188,300 tons. Although the English embargo was placed early in November, the imports in the fourth quarter, as just recently reported, were no less than 19,884 tons, or only 9 per cent. decrease from the quarterly average in the preceding nine months of the year. Deducting steel which is made without the use of ferromanganese, last year's production may be taken at about 22,000,000 tons, for which about 170,000 tons of ferromanganese would be required. The actual supply was 18,000 tons in excess of this amount. The year opened, therefore, with 18,000 tons more alloy than existed a year earlier, and with approximately as much ore as was in the country two years earlier. Thus the stocks of ore and alloy must have been very considerable.

Since the first of the year the stocks have been drawn upon very heavily. Imports of ferromanganese in quantity have occurred only in the past few weeks. Imports of ore were 9,849 tons in January, 27 tons in February and 398 tons in March, a total of 10,274 tons, representing a yield of 3000 to 3500 tons of ferromanganese. There has been some production of ferromanganese from domestic ores, but it has been very small. At the rate the steel works have been operating the consumption from January 1 to June 1 must be in the neighborhood of 85,000 tons. The figures we use are based upon experience, as indicated by the production statistics, and cannot be far out of the way. While they indicate very clearly that the stocks of ore and alloy at the beginning of this year were quite comfortable and have since been drawn upon very extensively, it is evident that the future may have unpleasant surprises in store. When the English makers advance prices on ferromanganese as sharply as they have it is very suggestive, at least, that the ore situation is serious, and the complete failure of our own ore import movement in February and March furnishes more than a suggestion in that direction.

The Pan-American Conference

Probably the most important result of the recent Pan-American conference at Washington is the great awakening which appears to have taken place among the countries of Latin America as to the necessity of co-operating with the United States in building up a transportation system that will permit a free and expeditious exchange of commodities. Every one of the nations represented at the conference produces a surplus of one or more products, while all are dependent on foreign sources for certain necessary supplies. The inadequacy of the present north and south ocean transportation service has long been felt, especially since the European war has compelled South and Central American countries to look to the United States for both markets and sources of supply, to say nothing of the means of financing domestic enterprises.

While it is too soon to predict the exact form of co-operation to be brought about by the movement set on foot at the conference, there can be no doubt that several of the leading South American countries will unite with the United States in a concrete project, the effect of which will be to stimulate the establishment and operation of steamship lines between the Americas. Several South American countries stand ready to join with the United States, either in a project for government-owned steamship lines or to encourage the establishment of private lines by mail subventions or some other form of subsidy.

Throughout the discussions of this important subject great care was exercised to avoid the use of the term "subsidy," because of the attacks that have been made upon such forms of direct government aid in this and other countries in recent years. The strong opposition to government ownership, however, has practically neutralized the objection to direct subsidies and it is not believed that serious opposition will develop if a carefully guarded plan of aiding the establishment and operation of private lines by government bounties can be devised and the adequate development of transportation facilities guaranteed thereunder by responsible capitalists.

Representatives of large interests who have noted the arguments of Administration officials in addresses before the conference declare that the reluctance of American capitalists to purchase or build ships for the South and Central American trade is largely due to the United States Government ownership project. It is pointed out that the Administration's plans involve the operation of steamships in the foreign trade at cost or less, figuring absolutely no return on the invested capital. With such a proposition before the country, backed by the Administration's influence, and lacking but a few votes of adoption at the last Congress, capitalists cannot be induced to put money into ships that may be obliged to compete with a large Government fleet run at a loss.

The establishment of improved banking facilities in South and Central America, in which large amounts of United States capital will be employed, is foreshadowed by the work of the conference. This should do much to overcome the influence wielded by European countries which, many years ago, as an initial step in the development of their Latin-American trade established numerous branch banks which have proved of great value.

Piece Work and the Premium System

Some recent developments have raised the question whether a reaction has set in in favor of the piece work system in preference to the bonus and premium plans and advocates of the latter are somewhat disturbed. For example, a large machine shop which had established a premium system, the operation of which has been somewhat widely discussed, has dropped it and has substituted straight piece work. The latter method of remuneration is finding new favor in other works, but under new conditions. Neither system is satisfactory from the workman's standpoint unless an agreement exists that the price or the time, once fixed, shall not be changed unless improved equipment be installed or new methods be developed by some one other than the man. If the employee himself creates a better and cheaper way of doing the work, he should be given the benefit. His associates doing absolutely the same work should not profit as the result of his individual ingenuity or enterprise.

The unbreakable price has been the basis of permanent success in any departure from the hourly wage rate. The great trouble with piece work is its evil name. As the result of cutting employees after they had speeded up to the point of earning more than an employer thought they should have, men learned the limit to which they could go and maintained production at that rate. But if a workman believes that a piece price or a rate fixed by time study will remain the same, regardless of what he achieves, he will go to the limit of reasonable exertion in accomplishing results. Today the piece work system is quite generally established on this basis; which means that scientific time studies have preceded rate fixing. It has been argued for the bonus system that "the frictional lag due to the inertia of the workman is changed by the bonus into acceleration." In other words, the bonus provides the spur of extra rewards for exceptional performance. It would be interesting to know to what extent the recent gain for the straight piece work system is due to rewarding every workman in direct proportion to his performance, thus putting substantial benefits within the reach of the average man.

The Westinghouse Russian Rifle Contract

The New England Westinghouse Company has been incorporated under the laws of Massachusetts with a capitalization of $2,000,000 for the purpose of taking over the property and assets of the Stevens Arms & Tool Company, Chicopee Falls, Mass., and the Stevens-Duryea Automobile Company, Springfield, Mass. All of the capital of the new company is owned by the Westinghouse Electric & Mfg. Company. Chairman George E. Tripp states that this expansion is a result of the order for 1,000,000 rifles taken from the Russian Government. It is not the intention of the Westinghouse Company to make any alterations whatever to the two Stevens plants in connection with this rifle order, which will be filled by organizations thoroughly experienced in the manufacture of this class of product. It is known that a number of New England manufacturers will play an important part in the filling of this enormous order, under sub-contracts. The cost of an army rifle, at the least estimate, under such conditions, is $20. The contract price, therefore, is undoubtedly much higher.

An Iron-Ore Contract Suit

Action brought at Duluth by Swallow & Hopkins, owners of a Mesaba non-Bessemer ore mine, against the Iroquois Iron Company, Chicago, alleging failure on the part of the defendant to complete a contract for the purchase of 100,000 tons of ore, has resulted in a verdict for the mine owners of $48,572. It is expected that an appeal will be taken. It is stated that the contract provided for its own termination if two successive cargoes should be shipped in which the ore analysis fell below the guarantee. Two shipments were made running low in iron, but only, as was claimed by the shippers with the knowledge and at the solicitation of the furnace company, which thereupon exercised its option of cancellation. Although the purchaser maintained that its action was confined to the automatic abrogation of the contract, effective through the fault of the shippers, judgment was rendered in the amount of expected profits from the completed contract.

The Pennsylvania Railroad, when it secures the 189 cars ordered last week, will have in its passenger service 3823 all-steel cars, 593 being Pullman. This road began substituting steel for wooden cars in 1906. The total passenger cars now on its system are 6869, so that, with the addition of the new ones referred to, more than half of all the passenger equipment used on its 11,991 miles will be all-steel. The 3283 all-steel cars it soon will have are almost one-third of that type in the United States.

The Thomas Iron Company, Easton, Pa., is sending out "pigs" of its Thomas-Vanadium iron, of paperweight size, at the same time calling attention to the tests of this iron made at Lafayette College.

PACIFIC COAST STEEL WORKS

Recent Expansion Significant—Uncertain Business Outlook in Washington

(*Special Correspondence*)

SEATTLE, WASH., May 24.—Industrially the Pacific Northwest does not look for much better times until there is some upward revision of the tariff and a cessation of the European War. The business done with Belgium in finished steel before the war is vividly remembered and what might now be the regular importation of European steel is regarded as a calamity unexpectedly avoided. The improvement in the East is shared here, but its small proportions thus far and the uncertainty of its duration are not encouraging plant expansion, let alone new projects. Business men are not a unit regarding the tariff question. The lumber business, the all-important one, has been so checked that the possibilities of Canada's capturing what is regarded as rightly belonging to Washington and Oregon have not been tested. Besides this, exports of lumber are hampered through scarcity of ships.

Another chilling influence to enterprise is the expectation of lower Panama Canal rates, or perhaps it might better be said a hope for lower transcontinental railroad freight rates, with a definite differential between railroad and all-water rates from Atlantic seaboard. The downward movement is calculated to help Eastern manufacturers to meet foreign competition, but does not encourage local manufacturing. It remains that early rapid industrial developments can only come with population increase, and industry will repeat the evolution of the East where centers tend to become individually independent.

NEW IRON AND STEEL PROJECTS

As it is, steel making is taking on proportions. Besides an open-hearth bar mill in Los Angeles, as described in *The Iron Age* of May 20, and several open-hearth furnaces in San Francisco, an open-hearth plant is now in process of construction at Seattle. The steel makers are finding a market not only for local consumption but fairly large sales are being made to China. The stores of scrap iron are being utilized, but both ore and pig iron, the latter commonly from China, are used to secure a product that will stand all the tests bar steel is expected to meet, such as tensile strength, bending the specimen back on itself cold, etc. While the Chinese pig iron has been laid down on the coast for $12 and even for $10 per ton, it is not believed that there will be the opportunity to shift from scrap to pig iron, as price differentials are not likely, it is thought, to disappear and make first one and then the other class of material commercially advantageous.

LITTLE NEW CONSTRUCTION

Building work is flat in both Portland and Seattle. Like the California coast, or for that matter, most of the country, the Northwest has had its real estate boom and where one does not find in the business buildings the branch offices of Eastern concerns, he commonly discovers real estate and land improvement offices. It appears, however, that times have liquidated considerable of the boom expansion, and it would not take a great increase in business to start building work.

Railroad buying promises little in the immediate future. With the growing coastwise water transportation business by way of the Panama Canal, recalling that a single vessel takes the contents of 25 trains, and with the uncertainties of freight charges as already mentioned, the railroads, it is admitted here, enjoy no enviable position. Broadly the West will profit by these changes, though the immediate total returns may not so indicate. As regards the transportation problem, quite a little satisfaction is evidenced in the Governmental river improvement which makes the Snake river navigable to Lewiston, Idaho, so wheat may be carried 800 miles or more by boat to Portland and Astoria on the mouth of the Columbia river.

The machine shops and foundries in this general section find repair work of existing machines and the building of special machines the usual order, and hence are operated more as job shops than otherwise. In some isolated cases the problems partake more of manufacturing; one plant, for instance, making a patented and popular machine for the mining industry, another devoting itself largely to machinery for saw mills or for logging, and another making some agricultural machinery for the special requirements of the district. That the metal trades are in a better condition is shown by increases from time to time in the numbers of employees at work. The mining machinery business is looking up, but largely in Alaska, with some buying for water-power developments.

In Seattle the Pacific Coast Steel Company, now operating busheling furnaces and rolling old rails into bars in this city, is installing a 40-ton open-hearth furnace and will roll steel bars and flats and angles up to 6 x 6 in. Besides its present equipment of rolls the company acquired and has moved to its Seattle plant the machinery of the Irondale, Port Townsend, Wash., plant of the defunct Western Steel Corporation. This includes a 22-in. Mesta mill, which will be used for breaking down the 10 x 10-in. ingots and form a part of the mill turning out the heavier products. The layout of the plant provides spaces for five or six furnaces. Oil fuel will be used and the first furnace will give a monthly capacity of more than 2500 tons, supplementing three 30-ton furnaces at the South San Francisco Works of the company. W. W. M.

The F. W. Heitmann Company, Houston, Texas, has issued an attractive booklet announcing the 50th anniversary of the founding of the business. Portraits are given of the founder, F. W. Heitmann, and the president of the company, F. A. Heitmann. The other officers are Mrs. T. C. Lorenzen and J. W. Dittmar, vice-presidents, and H. A. Neumann, secretary-treasurer. The firm is referred to as the first exclusive iron dealer in Texas. The incorporation dates from 1903.

The St. Paul Foundry Company, St. Paul, Minn., has arranged to be represented at Billings, Mont., by the Billings Foundry Company.

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The Iron and Metal Markets

ADVANCES DUE TO SPELTER

Galvanized Sheets and Pipe Higher

Bar Situation Stronger—More Buying of Basic Iron

The New York meeting of iron and steel manufacturers on Friday was a clearing house for more favorable sentiment than has come out at any similar meeting in two years. In the main operations at 75 per cent. were reported, with the Steel Corporation's percentage somewhat higher.

The large sales of round bars for shrapnel and for gun barrels are still the outstanding feature, 60,000 to 70,000 tons of such business having been placed in the Pittsburgh district in the past week. One considerable shrapnel contract on which work is under way in the Central West is understood to be for the United States Government.

Foreign business is well maintained, but the scarcity of vessels is more pronounced. The commandeering by the British Government of vessels that have been bringing iron ore from Cuba to Baltimore and Philadelphia is embarrassing companies which have felt secure in having charters covering several years.

Due to increasing difficulties of ocean transport, the acceptance of export orders for steel waits in many cases on actually securing vessel space. The fact that certain available vessels sail from Gulf ports has caused a diversion of some foreign business from Pittsburgh to Chicago mills. In the past week additional orders for sheet bars for Great Britain, including two lots of 5000 tons each, have gone to Chicago.

The Pennsylvania Railroad has put out a new specification for its 138,000 tons of rails for 1915 and it may be several weeks before the order is distributed. The casting of ingots with sinkheads, as in the case of some of the rails ordered in 1914, is called for. The extra of $4 asked by the mills for rails under the original 1915 specifications was not satisfactory to the road.

Rail orders of the week have been for minor tonnages—5100 tons for the Norfolk & Western, 3000 tons for the Louisville, Henderson & St. Louis, 3000 tons additional for the Chicago & Alton and 1600 tons for the Southern. The Southern Pacific order for 27,000 tons reported last week is for rolling in the spring of 1916. The New South Wales rail mill is making itself felt, taking a 30,000-ton Australian order that would have gone to British, Canadian or American makers.

Bar mills have taken some good orders apart from the implement trade and the price situation has been stiffened by war business and by expected car works demand, though specifications for very little of the steel required for recent car orders have yet come to the mills.

While Pittsburgh mills have kept up their recent rate of operation, there has been some slowing down in the Mahoning Valley, due to the cutting down of sheet bar rollings, now that so many mills are out of the galvanized sheet market.

As against 4 cents last week for No. 28 galvanized sheets, with one interest holding to 3.60 cents, though this was largely nominal, 4.25 cents is now generally quoted; but business is limited.

The spelter situation has grown more serious, and advances well above 23 cents are freely predicted in view of the way some consumers have been bidding for the metal. Prices of galvanized pipe have been advanced five points, or $10 a ton, presumably corresponding to 23-cent spelter. Further changes in all galvanized products will be gauged by the spelter market.

An export order for 275,000 boxes of tin plate for early shipment has been taken by the American Sheet & Tin Plate Company. The 200,000 boxes recently ordered by the Standard Oil Company go into exports after being made up into cans.

An advance in bolts, representing 5 per cent. on small sizes and 2½ per cent. on large bolts, has been announced by some makers but is not yet general.

In addition to 50,000 tons of basic iron sold in the Pittsburgh district as reported last week, 30,000 to 40,000 tons has been placed for last half delivery, with a furnace east of Pittsburgh. With less than Valley freight, the delivered price is equivalent to $12.50 at Valley furnace.

From a careful canvass of the pig iron situation in the districts tributary to Cincinnati, sellers figure that 50 per cent. of foundries are fully covered for the second half, and that at the present rate of melting 90 per cent. of what will be needed in the third quarter is represented by iron at the foundries or under contract.

Lake Superior iron ore shipments in May were 5,012,357 gross tons, as compared with 3,852,063 tons in May, 1914. Ore buying has been very conservative.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics

At date, one week, one month and one year previous

	June 2, 1915.	May 26, 1915.	May 5, 1915.	June 3, 1914.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia....	$14.25	$14.25	$14.25	$14.75
No. 2, Valley furnace...	12.75	12.75	12.75	13.00
No. 2 Southern, Cin'ti....	12.40	12.40	12.40	13.75
No. 2, Birmingham, Ala..	9.50	9.50	9.50	10.50
No. 2, furnace, Chicago*	13.00	13.00	13.00	14.00
Basic, del'd, eastern Pa..	13.25	13.25	13.25	14.00
Basic, Valley furnace....	12.50	12.50	12.50	13.00
Bessemer, Pittsburgh....	14.70	14.70	14.55	14.90
Malleable Bess., Ch'go*..	13.00	13.00	13.00	14.00
Gray forge, Pittsburgh...	13.45	13.45	13.45	13.65
L. S. charcoal, Chicago..	15.75	15.75	15.75	15.75
Billets, etc. Per Gross Ton:				
Bess. billets, Pittsburgh..	20.00	20.00	20.00	20.00
O.-h. billets, Pittsburgh..	20.00	20.00	20.00	20.00
O.-h. sheet bars, P'gh...	21.00	21.00	21.00	21.00
Forging billets, P'gh....	26.00	26.00	25.00	25.00
O.-h. billets, Phila.....	22.02	22.02	22.02	22.40
Wire rods, Pittsburgh...	25.00	25.00	25.00	24.50
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia..	1.17½	1.17½	1.17½	1.20
Iron bars, Pittsburgh....	**1.25**	1.20	1.20	1.25
Iron bars, Chicago.....	**1.20**	1.15	1.15	1.10
Steel bars, Pittsburgh...	1.20	1.20	1.20	1.12½
Steel bars, New York....	1.369	1.369	1.369	1.28½
Tank plates, Pittsburgh..	1.15	1.15	1.15	1.10
Tank plates, New York..	1.319	1.319	1.319	1.26
Beams, etc., Pittsburgh..	1.20	1.20	1.20	1.12½
Beams, etc., New York..	1.369	1.369	1.369	1.28½
Skelp, grooved steel, P'gh	1.15	1.15	1.12½	1.20
Skelp, sheared steel, P'gh	1.20	1.20	1.17½	1.25
Steel hoops, Pittsburgh..	1.25	1.25	1.25	1.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	June 2, 1915. Cents.	May 26, 1915. Cents.	May 5, 1915. Cents.	June 3, 1914. Cents.
Sheets, black, No. 28, P'gh.	1.75	1.75	1.80	1.85
Galv. sheets, No. 28, P'gh	4.25	3.75	3.40	2.75
Wire nails, Pittsburgh	1.55	1.55	1.55	1.50
Cut nails, Pittsburgh	1.55	1.55	1.55	1.55
Fence wire, base, P'gh	1.35	1.35	1.35	1.30
Barb wire, galv., P'gh	2.20	2.10	2.10	1.90
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	21.00	21.00	21.00	14.25
Electrolytic copper, N. Y.	18.75	18.50	18.62½	14.00
Spelter, St. Louis	22.00	18.75	14.00	4.95
Spelter, New York	22.50	19.00	14.25	5.10
Lead, St. Louis	4.82½	4.22½	4.07½	3.80
Lead, New York	4.90	4.30	4.20	3.90
Tin, New York	37.75	37.87½	39.00	30.45
Antimony, Hallett's, N. Y.	none	none	35.00	6.87½
Tin plate, 100-lb. box, P'gh.	$3.15	$3.15	$3.15	$3.30
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt	$1.50	$1.50	$1.50	$1.75
Furnace coke, future	1.65	1.65	1.65	1.90
Foundry coke, prompt	2.00	2.00	2.00	2.40
Foundry coke, future	2.15	2.15	2.15	2.50
Old Material, Per Gross Ton:				
Iron rails, Chicago	12.25	12.25	11.75	12.75
Iron rails, Philadelphia	15.00	15.00	14.50	15.00
Carwheels, Chicago	10.00	9.75	9.75	11.50
Carwheels, Philadelphia	11.50	11.50	11.00	11.25
Heavy steel scrap, P'gh	11.75	11.75	11.75	11.50
Heavy steel scrap, Phila.	11.00	11.00	11.00	10.50
Heavy steel scrap, Ch'go	9.50	9.50	9.25	9.50
No. 1 cast, Pittsburgh	12.00	12.00	12.00	11.50
No. 1 cast, Philadelphia	12.25	12.25	11.75	12.00
No. 1 cast, Ch'go (net ton)	9.00	9.00	9.00	9.75

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal has no stability, being dependent on vessel charges.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.15c. base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Wire Products.—Prices to jobbers. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots, annealed, $1.35; galvanized, $1.90. Galvanized barb wire and staples, $2.20; painted, $1.60. Wire nails, $1.55. Galvanized nails, 1 in. and longer, $1.30 to $1.50 advance over base price; shorter than 1 in., $2 or more advance over base price. Woven wire fencing, 71 per cent. off list for carloads; 70 off for 1000-rod lots; 69 off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.50	$1.55	$1.60	$1.65	$1.75	$1.85	$1.95	$2.05
Galvanized	2.20	2.25	2.30	2.35	2.45	2.55	2.95	3.05

Wire Rods.—Bessemer, open-hearth and chain rods, $25.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.20c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from June 1, 1915, all full weight:

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛, ¼ and ⅜	72	46½	⅛ and ¼	64	37
½	76	59½	⅜	64	37
¾ to 3	79	63½	½	68	47
			¾ to 2½	71	52

Lap Weld

2	76	60½	1¼	55	36
2½ to 6	78	62½	1½	66	47
7 to 12	76	60½	2	67	49
13 and 14	62½	60½	2½ to 4	69	52
15	60	60½	4½ to 6	69	52
			7 to 12	67	52

Reamed and Drifted

1 to 3, butt	77	61½	1 to 1½, butt	69	50
2, lap	74	58½	2, butt	69	50
2½ to 6, lap	76	60½	1¼, lap	53	34
			1½, lap	64	45
			2, lap	65	47
			2½ to 4, lap	67	50

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	67	49½	⅜	61	42
½	72	58½	½	66	51
¾ to 1½	76	62½	¾ to 1½	70	53
2 to 3	77	63½	2 and 2½	71	54

Lap Weld, extra strong, plain ends

2	73	57½	1½	65	48
2½ to 4	75	59½	2	67	49
4½ to 6	74	58½	2½ to 4	69	52
7 to 8	68	52½	4½ to 6	68	51
9 to 12	63	47½	7 to 8	61	46
			9 to 12	56	41

Butt Weld, double extra strong, plain ends

½	62	48½	½	56	40
¾ to 1½	65	51½	¾ to 1½	59	43
2 to 2½	67	53½	2 and 2½	61	45

Lap Weld, double extra strong, plain ends

2	63	49½	2	57	40
2½ to 4	65	51½	2½ to 4	59	45
4½ to 6	64	50½	4½ to 6	58	44
7 to 8	58	42½	7 to 8	51	35

To the large jobbing trade an additional 5 per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, in effect from May 1, 1915, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.	65	1¾ and 2 in.	52
2¼ in.	62	2¼ in.	49
2½ and 2¾ in.	68	2½ and 2¾ in.	56
3 and 3¼ in.	73	3 and 3¼ in.	60
3½ and 4½ in.	74	3½ and 4½ in.	62
5 and 6 in.	67	5 and 6 in.	56
7 to 13 in.	64		

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., 10 per cent. net extra.

2 in. and larger, over 22 ft., 10 per cent. net extra.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots

from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.25 to 1.30
Nos. 9 to 10	1.30 to 1.35
Nos. 11 and 12	1.35 to 1.40
Nos. 13 and 14	1.45 to 1.50
Nos. 15 and 16	1.55 to 1.60

Box Annealed Sheets, Cold Rolled

	Cents per lb.
Nos. 10 and 11	1.40 to 1.45
No. 12	1.40 to 1.45
Nos. 13 and 14	1.45 to 1.50
Nos. 15 and 16	1.50 to 1.55
Nos. 17 to 21	1.55 to 1.60
Nos. 22 and 24	1.60 to 1.65
Nos. 25 and 26	1.65 to 1.70
No. 27	1.70 to 1.75
No. 28	1.75 to 1.80
No. 29	1.80 to 1.85
No. 30	1.90 to 1.95

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11	3.25
No. 12	3.35
Nos. 13 and 14	3.35
Nos. 15 and 16	3.45
Nos. 17 to 21	3.60
Nos. 22 and 24	3.75
Nos. 25 and 26	3.95
No. 27	4.10
No. 28	4.25
No. 29	4.35
No. 30	4.50

These prices are wholly nominal.

Pittsburgh

PITTSBURGH, PA., June 1, 1915.

While there has been a slight slowing down in operations of steel mills in other districts, local plants are operating on an average of 75 to 80 per cent. of capacity. The Carnegie Steel Company is running this week close to 85 per cent. of ingot capacity. The slight decrease in operations at some of the steel plants, notably in the Mahoning Valley, is due to a falling off in specifications for sheet bars from mills that have pulled out of the market on galvanized sheets. It is believed this condition will be only temporary. While no official information is given out as to new war contracts taken, it is known that two or three of the leading steel companies have booked war material heavily in the past two weeks. Two Westinghouse interests are turning out very large quantities of shrapnel and other munitions of war. These are taking a very large amount of steel bars, most of this business going to the leading interest, but no information is given out as to the quantity involved. The plates, shapes and steel wheels for the 14,043 Pennsylvania Railroad cars are now being placed. Heavy advances in galvanized iron and steel pipe and galvanized sheets have been made.

Pig Iron.—The Carbon Steel Company has closed for 30,000 to 40,000 tons of basic for delivery over the last half of the year, the order going to a furnace east of Pittsburgh and the price being equivalent to about $12.50, Valley furnace. Two other local consumers are figuring on fairly large amounts of basic for last half delivery and may possibly close this week. A sale of 300 to 500 tons of Bessemer iron is reported at $13.75, Valley furnace, and the market seems to be firm at this price. Foundries are taking in iron more freely than for some time, and one leading consumer has an inquiry out for a quite large amount for last half delivery. W. P. Snyder & Co. report the average price of Bessemer iron in May to have been $13.659, and of basic, $12.65, both at Valley furnace. This is an increase in the Bessemer price over April of 5.9c., and in basic of 50c. The Bessemer iron market is now firm at $13.75, and practically all sellers are now quoting $12.65 for basic. We quote: Bessemer iron, $13.75; malleable Bessemer, $12.75; No. 2 foundry, $12.75 to $13; basic, $12.65, and gray forge, $12.50, all at Valley furnace, with a freight rate of 95c. a ton for delivery in the Cleveland and Pittsburgh districts.

Billets and Sheet Bars.—Local steel mills continue to operate close to 100 per cent. of capacity. Orders sent to the mills for rolling in May by the billet and rail sales bureau of the Carnegie Steel Company showed an increase over April. There has been a slight reduction in operations of some of the steel mills in the Youngstown district, due to falling off in specifications for sheet bars. We quote Bessemer and open-hearth billets at $19, and Bessemer and open-hearth sheet bars, $19.50 to $20, f.o.b. makers' mills, Youngstown; Bessemer and open-hearth billets, $20 to $21, and Bessemer and open-hearth sheet bars, $21 to $22, f.o.b. Pittsburgh. Forging billets are quoted at $26 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and lighter carbons. Forging billets running above 0.25 to 0.60 carbon take $1 per ton extra. Axle billets are $21 to $22.

Ferroalloys.—Consumers seem to have no trouble in getting ferromanganese in carload or larger lots for prompt shipment and at lower prices than were ruling some time ago. Two carloads of English 80 per cent. sold last week at about $85, delivered, and prices range from this figure up to $95. We quote 50 per cent. ferrosilicon in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; and over 600 tons, $71, delivered in the Pittsburgh district. We quote 10 per cent. ferrosilicon at $17; 11 per cent., $18; 12 per cent., $19, all f.o.b. cars at furnace, Ashland, Ky., Jackson or New Straitsville, Ohio, each of these points having a rate to Pittsburgh of $2 per gross ton. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads, 10c. in 2000-lb. lots and over, and 12½c. in smaller lots.

Structural Material.—No large jobs were taken by local interests in the past week and new inquiry is light. Of the three leading hot-rolled products, shapes, plates and steel bars, shapes are the quietest in demand, and the outlook for the near future for an increase in business is only fair. We quote beams and channels up to 15 in. at 1.20c. for June delivery, and 1.25c. for third quarter. On specific work for prompt shipment it is probable these prices would be slightly shaded.

Plates.—The Carnegie Steel Company is now receiving orders for the material for freight cars to be built for the Pennsylvania Railroad. It expects to furnish over 100,000 tons of plates, shapes, bars, axles and wrought steel wheels for these cars. The report that the Carnegie Company has just received orders from the William Cramp & Sons Ship & Engine Building Company for 13,000 tons of plates for boats for the Mexican Navigation Company is incorrect. These orders were placed nearly two months ago and most of the material has been shipped. The 3000 H-21 steel hopper cars to be built by the Cambria Steel Company will take close to 17 tons of plates and shapes for each car, or about 51,000 tons in all. The plates for the cars taken by the Pressed and Standard steel car companies will be placed with Pittsburgh mills. Reports that 3000 of the 5000 cars for the Rock Island road had been placed are untrue. This order is held up and may not be given out for some time, if at all. The current demand for plates is better, and the plate mills of the Carnegie Steel Company at the Homestead steel works and at the Upper and Lower Union mills are being operated practically full. Prices are reported firmer, and it is said 1.15c. is more easily obtainable and that in a few cases 1.20c. has been paid. We continue to quote ¼-in. and heavier plates for June shipment at 1.15c. to 1.20c., f.o.b. Pittsburgh.

Steel Rails.—The Pennsylvania Railroad has made up new specifications for its 138,000 tons of steel rails and these have been received by the Carnegie Steel Company. They involve a sink head on the ingot, and, if adopted, the rails will carry a lower extra in price than the previous specifications, for making which the rail mills asked about $4 a ton extra. It will probably be several weeks before this order is given out. We quote standard section rails of Bessemer stock at 1.25c., and of open-hearth, 1.34c., f.o.b. Pittsburgh. We quote light rails as follows, in carload lots: 8 and 10 lb. section, 1.275c.; 12 and 14 lb., 1.225c.; 16 and 20 lb., 1.175c.; 25, 30, 35, 40 and 45 lb. sections, 1.125c. The prices of light rails are materially shaded on large lots.

Sheets.—Most of the mills are refusing to quote on galvanized sheets. The American Sheet & Tin Plate Company is quoting today for spot shipment and to regular customers 4.25c. for No. 28 gauge, an advance of $13 a ton over its price of 3.60c. a week ago. Spelter

has sold at 20½c. and can hardly be had at any price. While present conditions in the spelter market last, prices on galvanized sheets will be purely nominal. One or two mills are quoting prices on galvanized sheets, based on the market for spelter, from day to day. One mill quoted on an inquiry 4.75c. at mill for No. 28 gauge, and was not anxious for the order. Prices on Bessemer black sheets are weaker, due to the fact that the mills not now quoting on galvanized are going after orders for black more vigorously and are shading prices. There is no change in blue annealed sheets, which are reported firm. We quote No. 28 Bessemer black sheets at 1.75c. to 1.80c.; No. 28 galvanized, 4.25c.; Nos. 9 and 10 blue annealed sheets, 1.30c. to 1.35c.; No. 30 black plate, tin-mill sizes, H. R. & A., 1.95c.; No. 28, 1.90c.; Nos. 27, 26 and 25, 1.85c.; Nos. 22 to 24, 1.80c.; Nos. 17 to 21, 1.75c.; Nos. 15 and 16, 1.70c. The above prices are for carload lots, f.o.b. at maker's mill, jobbers charging the usual advances for small lots from store.

Tin Plate.—The United States Steel Products Company took an order for 275,000 boxes of tin plate for immediate export, and this has been placed with the American Sheet & Tin Plate Company, which is now turning it out. This order is in addition to the one for about 200,000 boxes of tin plate taken recently by the same interest from the Standard Oil Company, but in the case of the latter order the plate is to be made into cans in this country. Specifications against contracts are reported coming in at a fair rate, but not as heavy as a month or so ago. Shipments of sheet and tin mill products by the American Sheet & Tin Plate Company in May were the heaviest in any one month for a long time. The new demand is reported more active. On new orders, we quote 14 x 20 coke plates at $3.15 to $3.25 per base box, but on desirable orders the lower price is being shaded.

Wire Rods.—An inquiry is in the market from the French Government for 4000 tons of open-hearth rods for prompt shipment. One local mill refused to quote on the order as it is so well filled up it could not handle it. The domestic demand for rods is more active and specifications are coming in freely. We quote Bessemer, open-hearth and chain rods at $25 to $25.50 for domestic business, while for foreign orders it is said that $26 and higher is being paid.

Carwheels.—It is understood that the order for the carwheels of the 14,043 cars for the Pennsylvania Railroad will be placed by the steel car companies direct with the makers of wrought steel wheels, and that it will be divided between Standard Steel Works Company, Midvale Steel Company, Forged Steel Wheel Company, and Carnegie Steel Company. It is stated that wrought steel wheels will be used on almost all of these cars. The makers of steel wheels regard this as very significant, indicating that the leading railroads are coming more and more to the use of wrought steel wheels. We quote standard 33-in. freight carwheels 6¼ in. rough bore at $16, and standard 36-in. passenger, the same bore, at $22.50 per wheel, f.o.b. Pittsburgh.

Shafting.—Due to the higher cost of steel bars, prices on shafting are firmer, and 68 per cent. off on desirable contracts for delivery over last half of this year is being generally quoted. On desirable orders for prompt shipment a few makers are quoting 69 to 70 per cent. off. Specifications for shafting from the machine-tool and automobile builders are quite active. New demand and specifications against contracts now represent fully 75 to 80 per cent. of capacity for making shafting. We quote cold-rolled shafting at 68 per cent. off in carload and larger lots, and 63 per cent. in small lots, f.o.b. Pittsburgh. On an order of very desirable specifications for prompt shipment possibly one or two makers would name 70 per cent.

Railroad Spikes.—The Norfolk & Western is in the market for 3000 to 5000 kegs for last half delivery. Specifications from the railroads against contracts are coming in at a fair rate. We quote standard railroad spikes at $1.35 to $1.40; small railroad and boat spikes, $1.45 to $1.50 in carload and larger lots per 100 lb., f.o.b. Pittsburgh.

Hoops and Bands.—Some complaint is heard from the makers over the low prices ruling on steel hoops. It is stated that with bars at 1.20c. prices on steel hoops should be 1.35c. to 1.40c. in order to allow any profit. The new demand for steel hoops is fair and makers report specifications, especially from the Pacific coast, as being quite active. One local maker of steel hoops is not quoting below 1.35c., and another is holding at 1.30c. We quote steel bands at 1.20c. for June and 1.25c. for third quarter, with extras as per the steel bar card, and steel hoops at 1.25c. to 1.35c., f.o.b. Pittsburgh. The lower price is being named by only one or two makers and on very desirable specifications for prompt shipment.

Skelp.—Two fairly large foreign inquiries for skelp are now being figured on by local mills. The domestic demand is heavier and the skelp mills are pretty well filled up for some time ahead. Prices are firm and are expected to be higher in the near future. We quote grooved steel skelp, 1.15c.; sheared steel skelp, 1.20c.; grooved iron skelp, 1.50c. to 1.55c.; sheared iron skelp, 1.60c. to 1.65c., delivered to consumers' mills in the Pittsburgh district.

Wire Products.—Owing to the high price of spelter, it is difficult to quote galvanized wire products, each mill naming its own price. One leading mill in this district has notified its agents to submit all inquiries for galvanized products to the home office before quoting. The foreign demand for barb wire continues active, and heavy shipments are being made by local mills. The domestic demand for wire nails is dull, but for smooth and barb wire is fairly active. To jobbers on new orders mills quote: Wire nails, $1.55; galvanized nails, 1-in. and longer taking an advance over this price of $1.30 to $1.50, and shorter than 1-in., $2 or more. Plain annealed wire is $1.35 to $1.40; galvanized barb wire and fence staples, $2.20 to $2.30; painted barb wire, $1.60, all f.o.b. Pittsburgh, with freight added to point of delivery, terms 30 days net, less 2 per cent. off for cash in 10 days. Prices on woven wire fencing are higher, and it is now quoted at 71 per cent. off in carload lots, 70 per cent. on 1000-rod lots, and 69 per cent. on small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—A few of the smaller implement makers are said to have closed their needs of steel bars for the last six months of this year only at the fixed price of 1.20c. The larger makers are holding off, desiring to contract for last half of this year and first half of next year, but the mills are trying to avoid taking contracts into 1916 at the 1.20c. price. A local interest that has large contracts for war material is reported to have placed two orders for steel bars amounting to 60,000 to 70,000 tons with a Pittsburgh mill. Prices on steel bars are very firm and 1.20c. for June is being generally quoted. Some fair-sized contracts have been placed for third quarter at 1.25c. The demand for common iron bars is heavier and two local mills are holding at 1.25c. minimum. We quote steel bars at 1.20c. for June and 1.25c. for third quarter. We quote common iron bars at 1.25c. to 1.30c., and test iron bars at 1.35c., f.o.b. Pittsburgh.

Cold-Rolled Strip Steel.—The new demand is heavier and makers report that specifications are more active than at any time this year. One-half, or 3000 tons, of the inquiry from Canada for 6000 tons of cold-rolled steel, is said to have been placed with a mill outside this district, but this is not confirmed. We quote hard-rolled steel, 1½ in. and wider, under 0.20 carbon, sheared or natural mill edge, per 100 lb., $2.75, delivered. Extras, which are standard among all the mills, are as follows:

Thickness, in.	Extras for thickness	Extras for soft or intermediate tempers	Extras for straightening and cutting to lengths not less than 24 in.
0.100 and heavier	Base	$0.25	$0.10
0.099 to 0.050	$0.05	0.25	0.15
0.049 to 0.035	0.20	0.25	0.15
0.034 to 0.031	0.35	0.40	0.25
0.030 to 0.025	0.45	0.40	0.40
0.024 to 0.020	0.55	0.40	0.50
0.019 to 0.017	0.85	0.50	1.10
0.016 to 0.015	1.25	0.50	1.10
0.014 to 0.013	1.95	0.50	1.25
0.012	2.30	0.50	coils only
0.011	2.65	0.50	coils only
0.010	3.00	0.50	coils only

Merchant Steel.—Mills report orders much better. Shipments in May were much heavier than in any month this year. Prices are firm, and one local interest has advanced its figures $1 to $2 per ton. For small orders we quote: Iron finished tire, ½ x 1½ in. and larger, 1.30c., base; under ½ x 1½ in., 1.45c.; planished tire, 1.50c.; channel tire, ¾ to ⅞ and 1 in., 1.80c. to 1.90c.; 1⅛ in. and larger, 1.90c.; toe calk, 1.90c. to 2c., base; flat sleigh shoe, 1.65c.; concave and convex, 1.70c.; cutter shoe, tapered or bent, 2.20c. to 2.30c.; spring steel, 1.90c. to 2c.; machinery steel, smooth finish, 1.70c.

Rivets.—Makers report the new demand for structural and boiler rivets as heavier and prices are also firm. We quote structural rivets at $1.45 to $1.50, and conehead boiler rivets at $1.55 to $1.60, per 100 lb., in carload lots, f.o.b. Pittsburgh, an advance of about 10c. over these prices being charged for small lots.

Nuts and Bolts.—No changes in prices were made at the conference here last week, but the market on nuts and bolts is reported firm and it is likely an advance will be made in the near future. Discounts on large lots are as follows:

U. S. S. Cold Punched Blank and Tapped, Chamfered, Trimmed and Reamed

½ in. and smaller, hex.....8.1c. per lb. off
⅝ in. and larger hex.....7.3c. per lb. off
Square, all sizes.....5.8c. per lb. off

Semi-Finished Tapped

½ in. and smaller hex.....85-10-10-10 off
⅝ in. and larger hex.....85-10-10 off

Black Bulk Rivets

7/16 x 6½, smaller and shorter.....80-10-5 off

Package Rivets 1000 Pcs.

Black, metallic tinned and tin plated....75-10-10 off

Wrought Pipe.—Makers of galvanized iron and steel wrought pipe have lowered discounts five points, equal to an advance of $10 per ton, effective from June 1, the result of the abnormally high prices on spelter. Orders for tubular goods entered in May showed a large gain over April, the actual orders taken by one leading interest being close to its capacity. No large contracts for oil or gas lines were placed the past week, but there is some inquiry out. Discounts on iron and steel pipe, as given on a previous page, are quite firmly held.

Boiler Tubes.—Orders for locomotive tubes entered by the mills in May were heavier than in any one month for a long time. Discounts, given on a previous page, are more or less shaded depending on the order.

Old Material.—Prices on iron and steel scrap are fairly strong, but very little material is moving from the dealers to consumers. One leading consumer is offering $11.75, delivered, for selected heavy steel scrap, but dealers are afraid to sell short at this figure, as the visible supply of this material is light. There is some inquiry out for low phosphorus melting stock, one sale of 600 tons being reported at a price slightly above $15 delivered. For delivery in Pittsburgh and nearby districts that take Pittsburgh freights, dealers quote about as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$11.75
Compressed side and end sheet scrap	$10.25 to 10.50
No. 1 foundry cast	12.00 to 12.25
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	9.25 to 9.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	11.75 to 12.00
No. 1 railroad malleable stock	10.50 to 10.75
Railroad grate bars	8.50 to 8.75
Low phosphorus melting stock	15.00 to 15.25
Iron car axles	18.75 to 19.25
Steel car axles	13.25 to 13.75
Locomotive axles, steel	19.75 to 20.25
No. 1 busheling scrap	10.25 to 10.50
No. 2 busheling scrap	7.25 to 7.50
Machine shop turnings	7.75 to 8.00
Old carwheels	11.75 to 12.00
Cast-iron borings	8.25 to 8.50
*Sheet bar crop ends	12.00 to 12.25
Old iron rails	12.75 to 13.00
No. 1 railroad wrought scrap	10.75 to 11.00
Heavy steel axle turnings	8.50 to 8.75
Heavy breakable cast scrap	10.75 to 11.00

*Shipping point.

Coke.—There has been a large increase in the output of coke, the H. C. Frick Coke Company having started up in the past few days 1084 ovens in order to supply more coke for blast furnaces that have been started by the Carnegie Steel Company. Two inquiries are in the market for blast furnace coke for last half of the year, but the makers are holding at $1.75, and the prospective customers are not willing as yet to pay this price. The Connellsville Courier reports the output of coke in the upper and lower Connellsville regions for the week ended May 22, as 306,691 net tons, an increase over the previous week of 9000 tons and the heaviest output in any one week for a long time. Some contracts for furnace coke that expire June 30 have been extended to cover the last half of this year. We quote best grades of furnace coke for delivery over the remainder of the year at $1.65 to $1.75, and for spot shipment $1.50 per net ton at oven. We quote standard makes of 72-hr. foundry coke for prompt shipment at $1.90 to $2.25, and on contracts for remainder of the year, from $2.15 up to $2.50 per net ton at oven.

Philadelphia

PHILADELPHIA, PA., June 1, 1915.

The tonnage booked in the week by steel mills does not show much, if any, increase, and there is no marked change in prices. Most of the mills made a better showing in May than in April. The betterment was due largely to the Pennsylvania Railroad's orders, and to the demand for special products, notably shrapnel-rounds and other materials called for by the war. In some directions the demand for shrapnel-rounds is overtaxing open-hearth capacity. Wire and its products continue in especially heavy export demand. All sizes of galvanized sheet and iron pipe have been advanced five points. The agricultural implement makers who have not bought for future requirements are still negotiating in the endeavor to get contracts for a full year, whereas the mills wish to limit such contracts to six months. Structural material is quiet, though business continues to come out unexpectedly. The specifying of bars is fairly satisfactory, with new business quiet and prices firm. The demand for plates holds up, but a little weakness is shown. The market for foundry pig iron is bolstered up by the ready acceptance of deliveries and the absence of cancellations, while many assert that the melt is actually greater. Sales, however, are confined to small lots. Further shipments of low phosphorus at premium prices have been made to Canada. A relatively small sale of basic is reported. The Government will not permit the exportation to belligerent countries of 27,000 tons of scrap material from the Panama Canal, which it is to sell.

Iron Ore.—The only arrival of foreign ore in the week consisted of 5830 tons from New Brunswick, Canada, understood to have been consigned to a furnace at Chester, Pa.

Pig Iron.—Purchases of foundry irons are not noteworthy as to size when taken individually, but their aggregate compares favorably with that of the preceding week. That business has been spotty of late is evidenced by the fact that some sellers booked more orders in May than in April, while others wrote less. Both sales and shipments of Virginia iron were better in May than in April. It is to be considered, however, that the volume of April orders was augmented by sales of basic. In view of all conditions, the aggregate of May is accounted satisfactory. A favorable aspect of the situation is that foundries are not only taking deliveries, but are showing no tendency to cancel orders. An eastern Pennsylvania steel company has purchased about 2000 tons of basic and may take more; otherwise, basic has been inactive. Standard low phosphorus continues to move steadily to meet current needs. There is a feeling on the part of some sellers that it is unwise for them to load up with contracts for future deliveries, and they are content, for the present, to sell from month to month at current prices. A transaction somewhat out of the ordinary was the sale of 2000 tons of low phosphorus for delivery in Canada. On deliveries

over the border a premium of 50c. per ton is obtained for nearby shipments and $1 per ton for future. With some steel-making irons shipments are keeping pace with production. Quotations for standard brands for early delivery in buyers' yards in this district are as follows:

Eastern Penna. No. 2 X, foundry	$14.25 to $14.50
Eastern Penna. No. 2 plain	14.00 to 14.25
Virginia, No. 2 X, foundry	15.25 to 15.75
Virginia No. 2 plain	15.00 to 15.25
Gray forge	13.25 to 13.50
Basic	13.25 to 13.75
Standard low phosphorus	20.00 to 20.50

Ferroalloys.—With transactions only possible at $100, seaboard, and still subject to approval from abroad, the market for 80 per cent. ferromanganese is quiet. The more important consumers are covered and have no need to take advantage of the easier deliveries now possible. The quotations for 50 per cent. ferrosilicon are unchanged at $71 to $73, Pittsburgh, according to quantity.

Bars.—Specifications for ordinary steel bars are proceeding at a good rate, but new orders are light. Nevertheless, a fair amount of third-quarter business has been booked on the basis of 1.25c., Pittsburgh, or 1.405c., Philadelphia. For the second quarter, 1.359c., Philadelphia, is the unchanged quotation. Iron bars are steady at 1.17½c. to 1.20½c., Philadelphia.

Plates.—An independent maker continues to operate at 80 to 85 per cent. of capacity and reports a steady inflow of miscellaneous orders. This maker quotes 1.20c., Pittsburgh, or 1.359c., Philadelphia, and is getting that figure on prompt business, and $1 per ton more for third quarter. In other directions, however, 1.309c. is quoted for early shipment, though here, also, 1.359c. is obtained in some instances. The contemplated placing of more orders for ships is a promising feature of the situation, while encouraging also is the placing of orders for locomotives. The Western Maryland Railroad has ordered 15 from the Lima Locomotive Corporation and the Chesapeake & Ohio has ordered 24 from the American Locomotive Company.

Rails.—The call by the Pennsylvania Railroad for new estimates on revised specifications has surrounded the pending big order of that company with more or less uncertainty, but it is not believed that its placement will be long delayed. The situation is summed up in the statement that the Pennsylvania wants the best rails for the least money, in line with the economy it is practising. In trolley line track accessories some fairly good business has been done.

Structural Material—A peculiarity of the situation is the lack of projects indicating future business. This has been the case for some time, yet the mills continue to book orders at a fairly satisfactory rate. Some of the business does not come to light until after contracts are placed. This is true particularly in the case of material required for plant extensions which obtain their impetus from war orders. The demand from merchants is satisfactory, and the quotation of 1.359c., based on 1.20c., Pittsburgh, for second quarter, holds without impairment save for some slight advantage taken of favorable freight rates. A real test of prices continues lacking.

Sheets.—The demand is fair, but nothing to shout over, as one producer says. The minimum quotation on No. 10 blue annealed continues at the 1.30c., Pittsburgh, base, or 1.459c., Philadelphia, although 1.509c. is obtained also.

Billets.—The demand for shrapnel-rounds is taxing the capacity of the open-hearth furnaces of some steel mills, which now refuse to book deliveries beyond October. Yet, regular customers are cared for and the quotation is unchanged at $22.02, Philadelphia. Forging steel commands an extra of $4 to $5 per ton, according to specifications.

Coke.—The principal transaction reported is the closing of a contract to run three years under which an eastern Pennsylvania furnace will be supplied with 8000 tons of coke per month for a period of three years. Payment will be based on a sliding scale. The market for foundry coke is quieter. Quotations for prompt furnace coke range from $1.55 to $1.60 per net ton at oven, but contract is firm at $1.75. Prompt foundry is quoted at $2 to $2.40 and contract foundry at $2.20 to $2.50. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—Actual conditions have changed but little, but the optimistic sentiment is persistent. The trade is not encouraged by the fact that the Government will not permit the exportation to any belligerent country of any portion of 27,000 tons of scrap material from the Panama Canal, bids for which are to be in June 7. A letter from the purchasing agent of the Panama Canal administration specifically prohibits such exportation and gives the penalties which have been prescribed. If reshipped to a country at war the shipment may be seized and the purchase money forfeited. If the material does leave the country the shipper is liable to fine to the extent of its value. The stand means that the United States Government will guard against any insinuation that it sold material which found its way to a belligerent. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$11.00 to $11.25
Old steel rails, rerolling	11.50 to 12.00
Low phos. heavy melting steel scrap	14.50 to 15.00
Old steel axles	14.00 to 14.50
Old iron axles	17.50 to 18.00
Old iron rails	15.00 to 15.50
Old carwheels	11.50 to 12.00
No. 1 railroad wrought	13.00 to 13.25
Wrought-iron pipe	10.75 to 11.00
No. 1 forge fire	8.00 to 8.50
Bundled sheets	9.00 to 9.50
No. 2 busheling	7.75 to 8.25
Machine shop turnings	8.50 to 8.75
Cast borings	8.00 to 8.50
No. 1 cast	12.25 to 12.50
Grate bars, railroad	9.00 to 9.25
Stove plate	9.00 to 9.25
Railroad malleable	9.50 to 10.00

Buffalo

BUFFALO, N. Y., June 1, 1915.

Pig Iron.—The market continues quiet, with buying in all grades comprised entirely of small lots. Shipments on contracts, however, are increasing in volume and heavy water shipments to Eastern points are being made, now that the Erie canal is open. There is a growing number of users who are anticipating their regular quotas on contract deliveries. Prices are practically unchanged. We quote as follows, f.o.b. furnace, Buffalo, for last half delivery:

No. 1 foundry	$13.00 to $13.25
No. 2 X foundry	12.75 to 13.25
No. 2 plain	12.75 to 13.00
No. 3 foundry	12.50 to 12.75
Gray forge	12.50
Malleable	12.75 to 13.25
Basic	13.25 to 13.75
Charcoal, regular grades and analysis	15.75 to 17.25
Charcoal, special grades and analysis	19.00 to 20.00

Finished Iron and Steel.—The total of specifications reported for the month of May was about the same as the total for April, with a lessening in wire products and an increase in bars and structural shapes. Bar material inquiries are coming out for third and fourth quarters and a moderate amount of contracting is being done for the third quarter. In several instances contracts have been taken for delivery through the entire last half, with an advance of $1 per ton in the fourth quarter prices over the third quarter. It is believed that if any concessions have been made, it has been by the smaller Eastern mills. A number of inquiries are in the market from Canadian manufacturers for prices and deliveries on rounds to be used in making shrapnel for the French Government, it being found that the Canadian mills are unable to meet the present requirements for both the British and the French. It is reported that the Canadian steel companies are going to use all their bar mills in rolling material for war supplies exclusively. In wire products, sales and inquiry are rather light, but specifications on contracts continue to be received in good volume with prices holding well, with the possible exception of recent advances on galvanized, some dealers not having yet definitely

met such advances to the full extent. Deliveries on flat wire, wire rope and wire specialties have become extended, some producers requiring fully five weeks to get out material. Deliveries are also becoming extended on bar and screw stock. It is expected that the demand for the specialties will eventually carry with it deliveries on common wire. The increased exportation of wire and wire products is responsible for the mills being crowded at their present pace. Galvanized steel and iron pipe has advanced $10 per ton, effective immediately. In fabricated structural lines business is fairly active. The C. F. Ernst Sons Company, Buffalo, has contract for 100 tons for D. H. Coplin & Co.'s store, and loft building, this city. The 200 tons for addition to the Erie Stove Company's works, Erie, Pa., went to the Pittsburgh Bridge & Iron Company, and 400 tons for the Reznor Stove Company's plant, Mercer, Pa., to the Pittsburgh-Des Moines Bridge Company.

Old Material.—Shipments on contracts continue in good volume, but no large sales in any commodity have been made during the week. One lot of 200 old carwheels is reported sold at $11.50 per gross ton, Buffalo. Heavy melting steel is not so active as a week ago, and the best price ruling to-day is $11 per gross ton, Buffalo. Purchases made during the past two or three weeks have apparently satisfied requirements for the time being. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$10.75 to $11.00
Low phosphorus steel	13.00 to 13.50
No. 1 railroad wrought scrap	10.50 to 11.00
No. 1 railroad and machinery cast	10.50 to 11.00
Old steel axles	12.00 to 12.50
Old iron axles	16.00 to 16.50
Old carwheels	11.00 to 11.50
Railroad malleable	9.50 to 10.00
Machine shop turnings	5.75 to 6.25
Heavy axle turnings	8.50 to 9.00
Clean cast borings	6.75 to 7.00
Old iron rails	11.00 to 11.50
Locomotive grate bars	9.00 to 9.50
Stove plate (net ton)	8.25 to 8.75
Wrought pipe	7.00 to 7.50
Bundled sheet scrap	7.25 to 7.75
No. 1 busheling scrap	8.50 to 9.00
No. 2 busheling scrap	6.50 to 7.00
Bundled tin scrap	9.00

Boston

BOSTON, MASS., June 1, 1915.

Old Material.—Nothing has transpired in the scrap market to change prices. The mills are busier and the usual dickering process is under way between the purchasing agents and the large dealers. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. Mill prices are approximately 50c. per ton higher.

Heavy melting steel	$8.25 to $8.50
Low phosphorus steel	13.75 to 14.75
Old steel axles	12.75 to 13.25
Old iron axles	20.25 to 20.75
Mixed shafting	12.00 to 12.25
No. 1 steel wrought and soft steel	8.25 to 8.75
Skeleton (bundled)	5.50 to 5.75
Wrought-iron pipe	7.00 to 7.50
Cotton ties (bundled)	5.25 to 5.75
No. 2 light	3.25 to 3.75
Wrought turnings	5.00 to 5.50
Cast borings	5.00 to 5.25
Malleable	7.50 to 7.75
Stove plate	7.00 to 7.50
Grate bars	5.25 to 5.50
No. 1 machinery cast (price to consumer)	13.00 to 13.50
No. 2 machinery cast (price to consumer)	11.50 to 12.00

Cincinnati

CINCINNATI, OHIO, June 2, 1915.—(*By Wire.*)

Pig Iron.—An encouraging feature of the present situation is the fairly satisfactory record of shipments on old contracts. The stove foundries, however, are not consuming the usual amount of iron, and their specifications on contracts are not up to standard. Few inquiries are out, and sales are exceedingly scarce, with only a small amount of business being done under cover. A central Ohio consumer wants 400 tons of Southern foundry iron and 300 tons is expected to be bought by a nearby melter, both for last half shipment. Estimates received from a leading pig-iron firm, which careful investigation indicates as being approximately correct, are not at variance with the report that about 50 per cent. of the foundries in this territory have covered for their last half supplies based on their normal requirements; 25 per cent. are partially covered; 10 per cent. are taken care of at the present rate of melt, and 15 per cent. have not bought and are using yard stocks or specifying on old contracts. The same firm estimates that fully 90 per cent. of foundry-iron melters have enough iron on hand or bought to carry them through the third quarter at the present rate of consumption. That an increase in the melt would bring about a resumption of buying is the opinion of all iron merchants, but no movement of this kind is in sight. An interesting fact reported is that from a sales tonnage standpoint the month of May this year was ahead of the corresponding month of 1914, but it was somewhat behind April of the present year. Southern iron is still obtainable at $9.50, Birmingham basis, for nearby shipment. Northern No. 2 foundry can be contracted for at $12.50, Ironton, for shipment through the year, and this price also rules for prompt shipment. Malleable is dull. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$12.90 to $13.40
Southern coke, No. 2 f'dry and 2 soft	12.40 to 12.90
Southern coke, No. 3 foundry	11.90 to 12.40
Southern No. 4 foundry	11.40 to 11.90
Southern gray forge	10.90 to 11.40
Ohio silvery, 8 per cent. silicon	16.01 to 16.26
Southern Ohio coke, No. 1	14.76 to 15.26
Southern Ohio coke, No. 2	13.76 to 14.26
Southern Ohio coke, No. 3	13.51 to 13.76
Southern Ohio malleable Bessemer	13.76 to 14.01
Basic, Northern	13.76 to 14.01
Lake Superior charcoal	16.20 to 17.20
Standard Southern carwheel	26.90 to 27.40

(*By Mail*)

Finished Material.—The holiday on Monday was welcomed by the sales departments of the sheet mills, as it gave them a breathing spell. The rapid advances in spelter have caused corresponding advances in galvanized sheets, which are now quoted around 4.25c., Pittsburgh, for No. 28, by a number of mills. The withdrawal of old prices and the consequent issuing of new quotations have kept the sales departments busy. It is reported that where anything like nearby deliveries can be made, purchasers freely pay the advances. No. 28 black sheets are held at 1.80c., Pittsburgh, and there is an improvement in business, as in some instances painted black sheets have been substituted for galvanized on rush work. Steel bars are unchanged at 1.20c., Pittsburgh. The Chesapeake & Ohio Railway Company has let contract through a subsidiary company, the Chesapeake & Ohio Northern Railway, for a bridge to be constructed across the Ohio River near Portsmouth, Ohio, for which a large tonnage of structural material will be required.

Old Material.—The market continues stagnant and prices have a downward tendency. The principal business transacted covers small lots, mostly for jobbing foundries. The larger buyers are very slow in making contracts. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards:

Per Gross Ton

Bundled sheet scrap	$6.25 to $6.75
Old iron rails	10.50 to 11.50
Relaying rails, 50 lb. and up	19.25 to 19.75
Rerolling steel rails	9.75 to 10.25
Melting steel rails	8.50 to 9.00
Heavy melting steel scrap	8.50 to 9.00

Per Net Ton

No. 1 railroad wrought	$8.50 to $9.00
Cast borings	4.50 to 5.00
Steel turnings	4.50 to 5.00
Railroad cast scrap	9.00 to 9.50
No. 1 machinery cast scrap	10.25 to 10.75
Burnt scrap	6.50 to 7.00
Old iron axles	13.50 to 14.00
Locomotive tires (smooth inside)	8.50 to 9.00
Pipes and flues	5.75 to 6.25
Malleable and steel scrap	7.00 to 7.50
Railroad tank and sheet scrap	5.00 to 5.50

Coke.—Foundry coke is a little more active. Many contracts expiring July 1 have not yet been renewed,

hence June is expected to be a fairly active month. Quotations on standard brands of Connellsville 72-hr. coke range from $2.10 to $2.50 per net ton at oven, the lower price being for prompt shipment. The average for contract business is $2.40. Furnace coke is very dull. It is quoted for prompt shipment around $1.50 per net ton at oven, and contract from $1.60 to $1.70. Wise County and Pocahontas operators are quoting about the same prices on contract business.

Cleveland

CLEVELAND, OHIO, June 1, 1915.

Iron Ore.—Little inquiry is coming out, and the only sales reported are a few small lots. Shipments from upper Lake ports are light, but are expected to improve this week with the 5c. reduction in freight rates on ore from the Mesaba range. This reduction went into effect today on two of the railroads serving the Mesaba region, but as local shippers have not yet received new tariffs from the third road, they are uncertain whether the low rate on this road will go into effect at once or on June 15, the date on which the Interstate Commerce Commission ordered the lower rate to become effective. We quote base ore prices as follows, delivered to lower Lake ports: Old range Bessemer, $3.75; Mesaba Bessemer, $3.50; old range non-Bessemer, $3; Mesaba non-Bessemer, $2.85.

Pig Iron.—The only activity is a limited buying of small lots. There is considerable hesitancy on the part of consumers to place contracts for extended delivery and some of those who are not already covered with contracts are placing orders for small lots for delivery in June and July. Shipments on contracts continue to improve slowly and the indications are that not much of the iron purchased for first half delivery will be held over until July or later. One furnace company reports that its shipments in May were the largest in 14 months. Prices on foundry iron are unchanged at $12.50 to $12.75, Valley furnace, for No. 2, the same quotations being made in Cleveland for outside shipments. Southern iron is dull with prices unchanged. M. A. Hanna & Co. blew in their Dover Furnace at Canal Dover, Ohio, on basic iron June 1. We quote, delivered Cleveland, as follows:

Bessemer	$14.55
Basic	$13.45 to 13.60
Northern No. 2 foundry	13.25 to 13.50
Southern No. 2 foundry	13.50 to 14.00
Gray forge	13.00
Jackson Co. silvery 8 per cent. silicon	16.37 to 16.62
Standard low phos. at furnace	19.75 to 20.00

Coke.—Foundry coke is fairly active. Some additional contracts have been placed for delivery during the year from July 1, and most consumers are now under contract. We quote the best makes of Connellsville foundry coke at $2.25 to $2.50 per net ton for spot shipment and contracts. Furnace coke is inactive, with quotations unchanged at $1.50 for prompt shipment and $1.65 to $1.75 for the last half.

Finished Iron and Steel.—The volume of business in finished lines continues satisfactory. Some of the mill agencies report a gain in May over April. Specifications are coming out in good volume from all classes of consumers except structural shops. Some new steel-bar specifications are coming from the implement makers in anticipation of future requirements. One new inquiry is for 3650 tons of steel for export. This includes 2560 tons of tank plates, 780 tons of angles and 310 tons of steel bars. No additional inquiry has come out for steel for shrapnel shells or other war material. Nothing has come so far from a recent local inquiry for 45,000 tons of steel bars for rifle barrels, and it is doubtful if the war order requiring this material will be placed with a Cleveland manufacturer. In building lines very little structural work is coming out. Plans will be out shortly for an addition to the Statler Hotel, Cleveland, requiring about 1500 tons, and bids will be received this week for 200 tons for the McKinley Memorial Building at Niles, Ohio. Prices on steel bars are firm at 1.20c. for June delivery and 1.25c. for the third quarter. Plates are quoted at 1.15c. to 1.20c., Pittsburgh, but there are reports of shading to 1.10c. The demand from the automobile trade for black sheets is heavy. Some mills are quoting no prices on galvanized sheets, owing to the advance in spelter, and others are naming prices only on definite specifications. The price for No. 28 galvanized is 4c. or higher. While the usual quotations on black sheets are 1.75c. to 1.80c. at mills, the lower price is still being shaded $1 a ton. An advance of five points has been made on galvanized steel and iron pipe. Iron bars, which are in light demand, are quoted at 1.15c., Pittsburgh. Warehouse business is good, We quote warehouse prices at 1.80c. for steel bars and 1.90c. for plates and structural material.

Bolts, Nuts and Rivets.—Some bolt business has been booked at the advance in prices noted last week, this advance being 5 per cent. on small bolts and 2½ per cent. on large bolts. There is some inquiry for last half rivet contracts, but the price has not been established. Some of the mills are advancing over current prices. We quote rivets at 1.40c. to 1.45c., Pittsburgh, for structural and 1.50c. to 1.55c. for boiler for carload lots. Revised bolt and nut discounts are as follows: Common carriage bolts, ⅝ x 6 in., smaller or shorter, rolled thread, 80 and 10 per cent.; cut thread, 80 and 5 per cent.; larger or longer, 75 and 15 per cent.; machine bolts with h. p. nuts, ⅝ x 4 in., smaller or shorter, rolled thread, 80 and 15 per cent.; cut thread, 80 and 10 per cent.; larger or longer, 80 per cent.; coach and lag screws, 85 per cent.; square h. p. nuts, blank or tapped, $6.40 off; hexagon h. p. nuts, blank or tapped, $7.30 off; c.p.c. and t. square nuts, blank or tapped, $6.10 off; hexagon ⅝ in. and larger, $7.60 off; 9/16 and smaller, $8.30 off; semi-finished hexagon nuts, ⅝ in. and larger, 85, 10, 10 and 5 per cent.; 9/16 and smaller, 85, 10, 10, 10 and 5 per cent.

Old Material.—The scrap market is in an unsettled condition, with new demand light and a tendency toward weakness. The activity is mostly in heavy melting steel scrap, and the tonnage of this grade that is being offered is larger than for some time. Turnings and borings have declined 25c. a ton, the weakness being attributed to the present large production and to the fact that Youngstown mills are loaded up with turnings and are holding back on borings. The prices on this grade for shipment to Brackenridge have declined 35c. a ton. The Pennsylvania and Lake Shore railroad lists will close this week. We quote, f.o.b. Cleveland, as follows:

	Per Gross Ton	
Old steel rails, rerolling	$11.00 to	$11.75
Old iron rails		12.00
Steel car axles	12.00 to	12.50
Heavy melting steel	10.25 to	10.75
Old carwheels	9.75 to	10.00
Relaying rails, 50 lb. and over		22.50
Agricultural malleable	8.00 to	8.50
Railroad malleable	10.00 to	10.25
Steel axle turnings	8.75 to	9.00
Light bundled sheet scrap	8.00 to	8.50
	Per Net Ton	
Iron car axles	$14.50 to	$15.00
Cast borings	6.25 to	6.50
Iron and steel turnings and drillings	5.50 to	5.75
No. 1 busheling	8.50 to	8.75
No. 1 railroad wrought	9.25 to	9.50
No. 1 cast	9.75 to	10.25
Stove plate	7.75 to	8.00

Birmingham

BIRMINGHAM, ALA., May 31, 1915.

Pig Iron.—The local market is characterized by a lack of inquiry, and few sales, but with large movements of metal and a disposition to rest on the large volume of sales made in April until the consumer shall have so far eaten into his orders as to start another buying movement. If the furnace interests were not so well sold ahead, they might be uneasy. One interest having two active stacks disposed of but 200 tons during the week, the price being uniform for the small lots embraced. Another with about the same active capacity has sold more than its make. No others claim to have done so well. The asking price is $10, with sales made at that figure as a rule. Some spot iron is believed to have changed hands under that level, but

in small quantities. Tennessee iron has sold on a basis of $9.50, Birmingham, just as other iron nearer Northern markets undersells Birmingham in competitive territory. The principal business done in May seems to have been in low grades for pipe interests and it is believed that they obtained concessions. The small buyer has been paying the new price straight along. Local consumption of basic metal will be as large in June as it has been in May in billet and wire mills, but the outlook for the manufacture of rails is not thought to be as encouraging as it was in May, when there was an unusually large output. There have been some sales of charcoal iron around $21. The idle stack of the Shelby Iron Company resumed the past week. Lack of vessel room hampers what would otherwise be a large export trade, but shipments of billets and wire abroad are made with some regularity. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$10.25 to $10.50
No. 2 foundry and soft	9.75 to 10.00
No. 3 foundry	9.25 to 9.50
No. 4 foundry	9.00 to 9.25
Gray forge	8.75 to 9.00
Basic	9.75 to 10.00
Charcoal	21.00 to 21.25

Cast-Iron Pipe.—Water and gas pipe foundries continue active on contracts heretofore awarded. Little new business came in the past week, but factories generally are well taken care of and prices are firm, with a tendency to demand a small premium on last half shipments and sizes not in hand. The Central Iron & Coal Company is operating its sanitary pipe shop at the furnace plant at Holt and its universal plant in Bessemer on full turn, consuming three-quarters of the furnace's daily output of 200 tons. Most sanitary shops are shy of orders and are on part time. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $21; 6-in. and upward, $18, with $1 added for gas pipe and a premium on second half and odd sizes.

Coal and Coke.—There is apprehension among the larger coal operators of a dull summer. An insistent and large offer of coal for Italy falls flat on account of failure to secure ship room, for which gulf ports have been scoured in vain. Spain would also take a lot of Alabama coal, but for the same conditions. Ships would solve many coal trade problems. The Pratt Consolidated has about completed its tipples on the Warrior River above lock 17 and will forward its initial cargoes by barge and tow-boat this week. Coal prices are weakening. Coke finds a market to the extent of the supply and prices are well maintained as follows, per net ton, f.o.b. beehive ovens: Furnace, $2.75 to $2.90; foundry, $3 to $3.25.

Old Material.—The market is inclined to dullness, although steel makers continue to take a fair supply. Quotations are quite well maintained. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	$13.00 to $13.50
Old steel axles	12.50 to 13.00
Old iron rails	12.50 to 13.00
No. 1 railroad wrought	8.50 to 9.00
No. 2 railroad wrought	7.50 to 8.00
No. 1 country wrought	8.00 to 8.50
No. 1 machinery cast	8.25 to 8.50
No. 1 steel scrap	8.00 to 8.25
Tram carwheels	8.25 to 8.50
Stove plate	7.00 to 7.50

St. Louis

ST. LOUIS, MO., May 31, 1915.

Pig Iron.—Sales continue in small lots, with buyers cautious as to quantity, but apparently willing to pay the firmer prices which now prevail. Ferromanganese is wanted at $100 per ton, Baltimore, and although some sales have taken place there is still a demand for it at this price.

Coke.—Contracts continue to be renewed by foundrymen on about the same tonnage basis as last year to run from July 1 for 12 months, but the price is lower than at this time a year ago by about 20c. per ton. By-product coke is quotable at $5.20 delivered St. Louis. Total new sales for the week will run about 3000 tons.

Finished Iron and Steel.—Demand for finished products continue at about the same rate as last reported, with prices a little firmer than previously quoted. The agricultural implement houses appear to be a little busier than they have been and to be taking a little more freely. Vehicle interests are quiet. Fabricating shops are buying material only as needed on jobs. The railroads have bought nothing and will not until at least July 1, if then. Bars, particularly reinforcing material, are in fair request. Tank plates show no life. Light rails are very dull and track fastenings are in only fair request. Movement out of warehouse is good, with consumers still willing to pay the higher prices rather than commit themselves to future contracts. We quote for stock out of warehouse as follows: Soft steel bars, 1.70c.; iron bars, 1.65c.; structural material, 1.80c.; tank plates, 1.80c.; No. 10 blue annealed sheets, 2c.; No. 28 black sheets, cold rolled, one pass, 2.55c.; No. 28 galvanized sheets, black sheet gauge, 4.20c.

Old Material.—While orders continue scarce, there is some little improvement in the demand, especially from the rolling-mill and steel foundry interests. Relayers are moving rather freely at firm prices, but the rest of the market shows no important change. The lists out include 8000 tons from the Baltimore & Ohio Southwestern, 350 tons from the St. Joseph & Grand Island, 700 tons from the Missouri Pacific and 400 tons from the Toledo, Peoria & Western. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton

Old iron rails	$10.00 to $10.50
Old steel rails, rerolling	9.50 to 10.00
Old steel rails, less than 3 ft.	10.25 to 10.75
Relaying rails, standard section, subject to inspection	22.00 to 23.00
Old carwheels	8.75 to 9.25
No. 1 railroad heavy steel scrap	8.75 to 9.25
Shoveling steel	7.75 to 8.25
Frogs, switches and guards cut apart	8.75 to 9.25
Bundled sheet scrap	5.50 to 6.00

Per Net Ton

Iron angle bars	$10.00 to $10.50
Steel angle bars	7.75 to 8.25
Iron car axles	13.50 to 14.00
Steel car axles	9.50 to 10.00
Wrought arch bars and transoms	10.75 to 11.25
No. 1 railroad wrought	7.50 to 8.00
No. 2 railroad wrought	7.50 to 8.00
Railroad springs	7.75 to 8.25
Steel couplers and knuckles	7.75 to 8.25
Locomotive tires 42 in. and over smooth inside	8.50 to 9.00
No. 1 dealers' forge	6.75 to 7.25
Mixed borings	4.50 to 5.00
No. 1 busheling	7.00 to 7.50
No. 1 boilers, cut to sheets and rings	5.75 to 6.25
No. 1 railroad cast scrap	7.75 to 8.25
Stove plate and light cast scrap	6.25 to 6.75
Railroad malleable	5.75 to 6.25
Agricultural malleable	5.25 to 5.75
Pipes and flues	5.50 to 6.00
Railroad sheet and tank scrap	5.75 to 6.25
Railroad grate bars	6.25 to 6.75
Machine shop turnings	4.75 to 5.25

San Francisco

SAN FRANCISCO, CAL., May 25, 1915.

A fairly large tonnage of finished products has arrived this month through the Panama Canal, reflecting in part a slight buying movement by merchants, while a considerable quantity is being forwarded to the Orient. Current business is quiet, as large consumers continue to limit their purchases to actual needs. Seasonable activity in the small country trade is offset by increased hesitation to proceed with new projects. The local nail market is rather demoralized, values in other lines being well maintained.

Bars.—Reinforcing bars show some increase, with a few scattered orders of moderate importance and small inquiries more numerous. Much of the business is being placed locally, and the output, though still below capacity, is growing. Plain steel bars are moving well in some quarters, but some important business usually placed at this season has been far below normal, leaving fair stocks in merchants' hands. The price of 1.70c. on carloads to jobbers, from local mill or warehouse, is steadily held. The jobbing price on small lots is 2.15c.

Structural Material.—A few new inquiries are appearing. Figures have been taken on about 130 tons for a bridge at Watsonville, Cal., and a bridge contract for Tehama County, Cal., amounting to about 1200 tons.

is expected in June, while numerous smaller bridges are in the market. Plans are expected shortly for a 12-story hotel for J. Herrscher at Geary and Powell streets, and plans are under way for an eight-story building for the Sharon estate. Schrader's Iron Works, a local fabricator, is building a small addition to its shop.

Rails.—Current business is confined pretty closely to light rails, and the demand is hardly as active as at the beginning of the month.

Plates.—Marine work continues to take a considerable tonnage. The Union Oil Company reports the letting of a contract to the Union Iron Works, this city, for a tank steamer of 80,000-bbl. capacity, and the requirements of the Mare Island Navy Yard are fairly heavy. Specifications for tank work are coming out well, but the jobbing trade continues dull.

Sheets.—Arrivals of galvanized sheets the last few weeks have been quite heavy, following rather large purchases at lower prices, and local stocks are now in good shape. Jobbing business is improving but shows no unusual activity, and the season of demand for corrugating sizes has hardly started. Prices are somewhat irregular, while some mills are practically refusing to quote. Local jobbing prices have advanced in keeping with those at the mills. There is little interest in blue annealed or black sheets.

Wrought Pipe.—Arrivals include considerable line pipe on old contracts as well as stock ordered by merchants. New business is slow, oil-country goods receiving no attention whatever, while distributive trade at the more important points shows little improvement.

Cast-Iron Pipe.—Palo Alto, Cal., has placed a contract with the United States Cast Iron Pipe & Foundry Company for about 250 tons, and the same company has a small order from Phoenix, Ariz. Imperial, Cal., has placed an order for 17,372 ft. of 4-in. pipe with Paine, Bailey & Co., San Francisco. Pasadena, Cal., has received bids for 1200 ft. of 8-in., 1200 ft. of 14-in. and 2100 ft. of 4-in. pipe. Considerable corporation business is also reported.

Pig Iron.—The only recent arrival of foreign iron was about 200 tons of Hanyang, and as far as known there is little afloat from other sources. A French ship with English pig iron and coke is out 124 days from Montevideo, and is believed to be lost. There is still considerable foreign iron of various kinds in the hands of melters and importers, which moves slowly at irregular prices. Some scattering shipments of Southern iron are coming this way, selling to arrive on the basis of about $20.50 per gross ton for No. 1 foundry.

Coke.—Smelters are taking a fairly heavy tonnage of coke not adapted for foundry use, and a cargo of smelter coke for this port is now being loaded in Australia. Foundry requirements are light, and the smaller foundries are buying in a limited way from local yards at about $14 per net ton. It is doubtful if any desirable foreign coke will arrive for many months, and there is an increasing movement among large buyers to place orders with domestic producers.

Old Material.—The tonnage of steel scrap melted is expected to increase somewhat in the near future, but requirements so far have been well covered, and there has hardly been enough business to establish definite values. Cast-iron scrap also is quiet, but frequent small sales are made at about the previous range of $14 to $16 per net ton.

According to advance statistics issued by United States Geological Survey the total production of Portland cement in 1914 was 88,230,170 barrels, as compared with 92,097,131 barrels in 1913, or a decrease of 4 2 per cent. Shipments amounted to 88,437,956 barrels, against 88,689,377 barrels in 1913, a decrease of 2.5 per cent. Stock on hand at the end of the year totaled 12,893,863 barrels, an increase of 14.9 per cent. over the stock on hand at the end of 1913. The average factory price per barrel for 1914 was $0.927, a decrease of 7.7 per cent. from $1.005, the average price of 1913.

New York

NEW YORK, June 2, 1915.

Pig Iron.—Two or three of the inquiries in this district noted last week have resulted in business. One foundry on the Hudson River has bought 1500 tons out of 2000 tons inquired for. A portion of this order was for charcoal iron. Pending New Jersey inquiries have been increased by one for 500 tons. Thus the sales in this immediate district for the week have been about 2500 to 3000 tons, with an equal amount pending. Prices have not changed, though irregularity is still noted, particularly in competition among Eastern furnaces, Buffalo iron not having figured largely in the metropolitan district of late. New England foundries are kept fairly employed, some of them, due to connections with machine tool concerns, being busier than others. Quotations at tidewater are as follows: No. 1 foundry, $14.50; No. 2 X, $14 to $14.25; No. 2 plain, $13.75 to $14; Southern iron, $14.25 to $14.50 for No. 1 and $14 to $14.25 for No. 2.

Ferroalloys.—Advices are reported of licenses to ship ferromanganese during June, but how much is to come is uncertain. Private word from England is that the manganese ore situation there is by no means satisfactory. Opinion here is that the amount of shipments to this country is entirely indefinite and that curtailment is likely at any time, depending upon war developments. There is some contracting for future delivery at $100, seaboard, subject to ability to ship. Business in 50 per cent. ferrosilicon both for domestic and foreign demand is unusually good at the prevailing quotation of $71 to $73, Pittsburgh.

Structural Material.—The holiday period and the international situation as directly affecting this country have tended to accentuate an already dull market. June opens with not far from 37,000 tons on which bids have been asked for in May and previous months, the largest project being 6400 tons for Section 1, Route 29, of the subway system under the Eastern Parkway, Brooklyn. Bids for this are to go in about June 15. Next to this the largest projects are several buildings of from 1200 to 3000 tons. In orders actually placed May is not generally regarded as having been equal to either March or April. Small undertakings continue to dominate the situation, large projects outside of subway work being negligible. Some of the smaller projects on which bids are asked are the following: 200 tons for a machine shop for the Maine Central at Waterville, Maine; 200 tons for the McKinley Memorial Library at Niles, Ohio; 200 tons for a bank at Scranton, Pa.; 250 tons for a high school at Syracuse, N. Y.; 800 tons for a storehouse for the Grand Union Tea Company at Front and Jay streets, Brooklyn, and 280 tons for a parochial school at Shelter Island. Among contracts let are the following: 600 tons to Levering & Garrigues for a building for Mrs. Lillia Babbitt Hyde at Fortieth street and Madison avenue; 450 tons for a high school at Worcester to the Eastern Bridge & Structural Company; 275 tons for bridges for the West Shore Railroad to the Fort Pitt Bridge Company; 400 tons for bridges for the Lehigh Valley to the American Bridge Company; 240 tons for bridges for the Virginia Railroad to the Virginia Bridge & Iron Works; 400 tons for the Cliff residence at Ninety-sixth street and Riverside Drive, and 150 tons for a recreation building at Sailors' Snug Harbor, both to the Heddon Iron Company; 400 tons for the Syracuse cold storage warehouse to Smith & Caffrey; 250 tons for a fine arts building at Rochester to the Seneca Engineering Company; 250 tons for a Bedford avenue apartment building, in Brooklyn, to the William Schwenn Iron Company, and 400 tons for an 8-story apartment house in Rochester, to the Phoenix Bridge Company. The American Bridge Company has also received the contract for the train shed for the Lehigh Valley station at Buffalo, 1400 tons, and the same road has awarded the contract for 100 tons for the extension to its shops at Sayre, Pa. The 2500 tons of bridge work for which the Pennsylvania Railroad has been in the market has been awarded to various fabricators, the Pennsylvania Steel Company having received about 900 tons of it. We quote mill shipments at 1.20c., Pitts-

burgh, or 1.369c., New York, and from store, 1.85c. to 1.90c., New York. Desirable specifications are going at less than these prices.

Plates.—It is estimated that more cars were ordered in April than in any month since February, 1913. This may eventually strengthen the market, which is admittedly weaker than in shapes and bars. No strengthening from this or any other source is thus far evident, domestic demand being very moderate. Concessions from 1.20c., Pittsburgh, are admitted for desirable tonnages, even for third quarter delivery. May was only a fair month. There is an export inquiry for 1800 tons of ship plates. Outside of the cars on which estimates are reported as being taken for the Russian government, there are still about 14,000 cars before the market. About half of these are held up for financial and other reasons. New inquiries within the last week are 18 passenger cars and 6 baggage cars for the Deleware & Hudson, 200 box cars for the Detroit, Toledo & Ironton and 650 box cars and 10 cabooses for the Havana Central. The Pressed Steel Car Company has received an order for 100 box cars from the Long Island Railroad, and the Central Car & Locomotive Company, an order for 700 steel underframes and 50 caboose cars from the Chesapeake & Ohio. We quote steel plates at 1.15c. to 1.20c., Pittsburgh, or 1.319c. to 1.369c., New York, and from store, 1.85c. to 1.90c., New York.

Iron and Steel Bars.—There is no desire on the part of producers to contract ahead or of consumers to commit themselves; as a consequence very little has been done in contracts for the third quarter. Specifications are good and prices are firm. Demand for export is still the feature, with constant new inquiries and sales. May has shown a progressive improvement in the case of most producers and one company in particular has made large bookings in this district recently. In iron bars the situation is unchanged, the domestic demand being good and prices firm. We quote mill shipments of steel bars at 1.20c., Pittsburgh, or 1.369c., New York, and refined iron bars, 1.20c. to 1.25c., New York. Out of store in New York iron and steel bars are 1.80c. to 1.85c.

Old Material.—Quiet conditions continue to prevail in the market for heavy melting steel scrap and rolling-mill material. Leading brokers are inclined to believe that prices may decline, as consumers are making lower offers, are again rejecting material that ordinarily passes inspection readily and the United States Government is offering a heavy quantity of old material to come from Panama which will probably have to be absorbed by consumers on this coast. It would seem likely that with this great addition to the usual railroad lists the market will be over-supplied. In the meantime, however, the great majority of holders of steel scrap and rolling-mill stock are not disposed to part with their material under the prices recently prevailing. Brokers' quotations to local dealers and producers, per gross ton, New York, are as follows:

Old girder and T rails for melting	$8.75 to	$9.00
Heavy melting steel scrap	8.75 to	9.00
Relaying rails	19.00 to	19.50
Rerolling rails (nominal)	8.75 to	9.00
Iron car axles (nominal)	15.25 to	15.75
Steel car axles (nominal)	11.75 to	12.25
No. 1 railroad wrought	10.50 to	10.75
Wrought-iron track scrap	9.50 to	9.75
No. 1 yard wrought, long	9.50 to	9.75
No. 1 yard wrought, short	9.00 to	9.25
Light iron	3.25 to	3.75
Cast borings	5.50 to	5.75
Wrought turnings	6.00 to	6.25
Wrought pipe	8.00 to	8.25

Foundries are not buying any more freely than has for some time been their practice. Quotations to consumers on cast scrap are as follows, per gross ton, New York:

Old carwheels	$9.25 to	$9.50
No. 1 heavy cast, broken up	11.50 to	11.75
Stove plate	8.00 to	8.25
Locomotive grate bars	7.50 to	8.00
Malleable cast (railroad)	7.50 to	8.00

Cast-Iron Pipe.—While the volume of inquiry from private buyers continues excellent, municipal lettings are slow, no business of importance of this character being in sight. Prices are steadily strengthening. Carload lots of water pipe, class B and heavier, are quoted at $22 to $22.50, per net ton, tidewater, while class A and gas pipe take an extra of $1 per ton.

Chicago

CHICAGO, ILL., June 2, 1915.—(*By Wire*).

Additional orders for sheet bars for Great Britain placed with local mills last week include two of 5000 tons each and other scattering lots. Available boats for ocean freight are so few that before accepting orders the securing of a carrier is now an essential preliminary step. Other sales, made up of rails, tie plates, angle bars, car plates, and structural shapes, and reported, to the aggregate amount of 15,000 tons, contributed to a total which compares favorably with that of any recent similar period. The prospect for structural tonnage for fabrication embraces some large projects which are now considered imminent, including the St. Louis bridge approaches and the railroad bridge at Paducah. Little or no progress is being made in the closing of implement bar contracts, the implement interests adhering to the contention that the nature of their business requires protection at one price through the year, while the mills thus far are maintaining with equal firmness their decision to accept no contracts covering deliveries beyond January 1. Advances in the price of bar iron, accompanied by the gathering in of a fair assortment of orders, and in the price of bolts and nuts, in connection with which there is now under way a period of contracting, are signs indicating some measure of improvement. The advance in galvanized sheet prices appears to have eliminated all quotations below 4.25c., Pittsburgh, and to have increased the number of mills unwilling to make any quotation. For pig iron there is but little inquiry. The situation in this market is not altogether lacking in evidences of improvement, in view of the intention to blow in an additional furnace in this district and in view of the greater extent in which producers are demanding full differentials for higher silicon.

Pig Iron.—Inquiry is exceedingly light. There is an inquiry for 500 tons of malleable for an Indianapolis foundry and for 1500 tons of charcoal iron. Prices for regular grades are unchanged, but some accession of strength on the part of the furnaces is manifested in their disinclination to quote less than full differentials for higher silicons. 'It is the expectation that a second Mayville furnace will be blown in before the end of the week. Contracting for coke has been in progress for the past two or three weeks, and the interest of foundries in general in providing for their requirements falls but little short of normal. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 2 to 5		$15.75
Lake Superior charcoal, No. 1		16.25
Lake Superior charcoal, No. 6 and Scotch		16.75
Northern coke foundry, No. 1	$13.50 to	13.75
Northern coke foundry, No. 2	13.00 to	13.50
Northern coke foundry, No. 3	12.50 to	13.00
Southern coke, No. 1 f'dry and 1 soft	14.00 to	14.25
Southern coke, No. 2 f'dry and 2 soft	13.50 to	14.00
Malleable Bessemer	13.00 to	13.25
Standard Bessemer		16.50
Basic	12.50 to	13.00
Low phosphorus	20.00 to	20.50
Jackson Co. and Ky. silvery, 8 per cent.	16.50 to	17.00
Jackson Co. and Ky. silv'y, 10 per cent.	17.50 to	18.00

Rails and Track Supplies.—The placing of an additional 1500 tons of rails by the New York Central comprised the only new rail business of the week, but the buying of track fastenings included about 2000 tons of tie plates, 1200 tons of angle bars, 2500 kegs of spikes, and 1000 kegs of bolts. We quote standard railroad spikes at 1.45c. to 1.50c., base; track bolts with square nuts, 1.90c., base, all in carload lots, Chicago; tie plates, $23.25 to $24.25, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.07c.; 16 to 20 lb., 1.12c.; 12 lb., 1.17c.; 8 lb., 1.22c.; angle bars, 1.50c., Chicago.

Structural Material.—Some of those who have quoted to the Pullman Company on car construction materials intended for use in the Russian cars have been unofficially advised that the Pullman Company will build 6000 as previously reported. No other new carbuilding of importance has appeared. In other directions projects involving fabricated steel are more promising. Assurances considered authoritative by local fabricators have been had that both the approaches for the bridge at St. Louis, requiring 24,000 tons, and the long delayed railroad bridge at Paducah, Ky., for which it is estimated some 16,000 tons will be required, will proceed shortly to the placing of contracts. Bids were taken today, at Chicago, by the Union Station Company, on approximately 2000 tons for the Monroe Street bridge, and 350 tons of sheet piling. The only contract of importance reported as placed last week was for a new building for the University of California, for which the American Bridge Company will furnish about 1150 tons. An order for about 600 tons for the Chicago speedway has also been placed. The market for structural shapes appears to be somewhat firmer, although the distinction between quotations for tonnage requirements and lesser contracts is still marked. For small lots we continue to quote for Chicago delivery from mill 1.389c.

Local jobbers report no great improvement in the aggregate tonnage. We quote for Chicago delivery of structural shapes out of shop 1.75c.

Plates.—A local carbuilder has added to its recent orders 2000 tons of plates, and there is also an inquiry in this market for a small lot of tank cars. In other respects the plate situation presents no new features. We quote for Chicago delivery of plates from mill 1.289c. to 1.339c.

We quote for Chicago delivery of plates out of stock 1.75c.

(By Mail)

Sheets.—Interest in the sheet market continues to center around the course of prices for galvanized. Advances last week were probably more precipitous and followed each other in more rapid succession than at any time previously. One maker raised its quotation by sharp jumps from 3.40c. to 4.25c., Pittsburgh, and finally withdrew from the market. Figured on the basis of spelter at 21c., the price of No. 28 galvanized might reasonably approximate 5c., and on this basis demand is obviously limited, and a number of producers are declining entirely to quote. Black sheets are moving very slowly, despite the encouragement producers are lending to the use of painted sheets as a substitute for galvanized, and prices reflect the weakness. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.489c.; No. 28 black, 1.889c. to 1.939c.; No. 28 galvanized, 3.589c. to 3.789c.

Local jobbers have moved up their quotations for galvanized sheets, out of store, in keeping with the market. We quote for Chicago delivery from jobbers' stocks as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.55c.; No. 28 galvanized, 4.20c.

Bars.—The advance to the basis of 1.20c. for bar iron, announced recently by one of the mills, resulted in the booking of a round tonnage at 1.15c. and the establishing, subsequently, of 1.20c. as the general market level. Business now on the books represents a larger tonnage than has been scheduled for some time. At the new price very little new business is coming out. Mill operations continue to reach barely 50 per cent. of capacity. The steel-bar situation is adding to its strength rather than otherwise. The capacity being absorbed in the rolling of shrapnel bars has unquestionably contributed strength to the situation with respect to merchant bars. Negotiations involving implement steel are being conducted with marked firmness. We quote for mill shipments as follows: Bar iron, 1.20c.; soft steel bars, 1.389c.; hard steel bars, 1.20c.; shafting, in carloads, 65 to 68 per cent. off; less than carloads, 60 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 60 per cent. off, and in carloads, 62 per cent. off.

Rivets and Bolts.—On the eve of the campaign for implement contracts the manufacturers of bolts and nuts have issued a revised price list showing an advance of from 2½ to 5 per cent. To what proportion of the business now under negotiation the new prices will be applicable will be measured by the strength the general situation develops. Quotations are as follows: Carriage bolts up to ⅝ x 6 in., rolled thread, 80-10; cut thread, 80-5; larger sizes, 75-15; machine bolts up to ⅝ x 4 in., rolled thread, with hot pressed square nuts, 80-15; cut thread, 80-10; larger sizes, 80; gimlet points coach screws, 85; hot pressed nuts, square, $6.40 off per cwt.; hexagon, $7.30 off per cwt. Structural rivets, ¾ to 1¼ in., 1.45c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2c.; boiler rivets, 2.10c.; machine bolts up to ¾ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to ¾ x 6 in., 75-10; larger sizes, 70-15 off; hot pressed nuts, square, $6, and hexagon, $6.70 off per cwt.

Wire Products.—A seasonable quiet has fallen upon the wire trade, and, though some of the mills are continuing to show heavy production records, the movement of material to the trade has slowed down measurably. Prices that were exceptional in the cases of favored buyers, a fortnight since, are now general. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.589; wire nails, $1.739 to $1.789; painted barb wire, $1.789; galvanized barb wire, $2.289 to $2.389; polished staples, $1.789; galvanized staples, $2.289 to $2.389, all Chicago.

Cast-Iron Pipe.—The award of 2265 tons of 16 and 24 in. pipe at Chicago, last week, was made to the American Cast Iron Pipe Company, the price being $22.85, and this was the only letting of importance closed. At Milwaukee, 300 tons is to be bought and at Kenosha, Wis., 2500 tons. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $25.50; 6 to 12 in., $23.50; 16 in. and up, $23, with $1 extra for gas pipe.

Old Material.—Activity in the scrap market has been reduced to few and unimportant transactions. The lack of demand for rolling-mill grades is evidenced in the softening of the prices offered for wrought scrap and busheling. Iron car axles find practically no takers. The week's offerings of railroad scrap are heavy and include a long list from the Pennsylvania, 8000 tons from the Baltimore & Ohio, 6500 tons from the Chicago & Northwestern and a blank list from the New York Central. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$12.25 to $12.50
Old steel rails, rerolling	10.25 to 10.75
Old steel rails, less than 3 ft.	10.00 to 10.50
Old carwheels	10.00 to 10.25
Heavy melting steel scrap	9.50 to 9.75
Frogs, switches and guards, cut apart	9.50 to 9.75
Shoveling steel	9.00 to 9.25
Steel axle turnings	7.00 to 7.25

Per Net Ton

Iron angles and splice bars	$11.50 to $12.00
Iron arch bars and transoms	12.00 to 12.50
Steel angle bars	8.50 to 8.75
Iron car axles	13.50 to 14.00
Steel car axles	10.25 to 10.50
No. 1 railroad wrought	9.00 to 9.25
No. 2 railroad wrought	8.25 to 8.75
Cut forge	8.25 to 8.75
Steel knuckles and couplers	8.50 to 8.75
Steel springs	9.00 to 9.25
Locomotive tires, smooth	8.50 to 9.00
Machine shop turnings	5.50 to 5.75
Cast borings	5.00 to 5.50
No. 1 busheling	7.25 to 7.50
No. 2 busheling	6.00 to 6.50
No. 1 boilers, cut to sheets and rings	5.50 to 6.00
Boiler punchings	8.25 to 8.50
No. 1 cast scrap	9.00 to 9.25
Stove plate and light cast scrap	8.00 to 8.25
Grate bars	7.50 to 7.75
Railroad malleable	8.25 to 8.50
Agricultural malleable	7.25 to 7.50
Pipes and flues	6.25 to 6.75

L. R. Merritt & Co., manufacturers' agents, formerly of 95 Liberty street, have moved into larger offices in the new Vanderbilt Concourse Building, 52 Vanderbilt avenue, New York. They represent the Brownell Company, Springfield Boiler & Mfg. Company, Craig Ridgway & Son Company, Coppus Engineering & Equipment Company, Advance Pump & Compressor Company and James McMillan & Co.

British Market Advancing

Pig Iron Export Easier, But Cost of Production Increasing—Coke Supply Small

(*By Cable*)

LONDON, ENGLAND, June 2, 1915.

The pig-iron market is very quiet, but sentiment is improved owing to easier export conditions. Arrangements have been completed for forming local committees with authority to issue licenses for shipments to neutral countries. Shipments remain small but an improvement is expected. Costs of production are increasing and the supply of coke is small. Furnaces in blast are 165 against 168 a year ago. Stocks of pig iron in Connal's stores were 152,998 tons at the close of last week, against 150,376 tons one week previous.

Semi-finished steel is firm but there is not much business. There have been several advances in finished steel in which the tendency is still upward and the output very small. About 30,000 tons of rails for Australia is reported placed with the Broken Hill Proprietary Company. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 18s. 6d. ($4.50) against 18s. 3d. ($4.44) last week.

Cleveland pig-iron warrants, 65s. 7½d. ($15.97), compared with 65s. ($15.82) last week.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 65s. 9d. ($16) against 66s. ($16.06) one week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £11 15s. ($57.18), compared with £11 5s. ($54.75) a week ago.

Steel ship plates, Scotch, delivered local yards, £9 15s. ($47.44).

Steel rails, export, f.o.b. works port, £8 7s. 6d. ($40.75) against £8 2s. 6d. ($39.54) a week ago.

Hematite pig iron, f.o.b. Tees, 102s. 6d. ($24.94).

Sheet bars (Welsh), delivered at works in Swansea Valley, £7 ($34.06).

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £9 15s. ($47.44) against £9 10s. ($46.23) last week.

Steel bars, export, f.o.b. Clyde, £10 15s. ($52.31) against £10 5s. ($49.88) last week.

Ferromanganese, f.o.b., £20 15s. ($100.98).

Ferrosilicon, 50 per cent., c.i.f., £14 5s. ($69.35) against £14 ($68.13) last week.

Metal Market

NEW YORK, June 2, 1915.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
May	Lake	Electrolytic	Tin, New York	New York	St. Louis	New York	St. Louis
26	21.00	18.50	37.25	4.30	4.22½	19.25	19.00
27	21.00	18.50	37.25	4.40	4.32½	20.00	19.75
28	21.00	18.62½	37.75	4.50	4.42½	21.00	20.50
29	21.00	18.75	.....	4.75	4.67½	22.00	21.75
June							
1	21.00	18.75	37.75	4.90	4.82½	22.50	22.00

Attention has been centered in lead, the price of which has been advanced $14 per ton in a week by the leading interest. Every day has seen an advance and buyers have followed the market. The scarcity of spelter has forced nominal quotations to 22.50c. to 23c. The high price of antimony is sustained. Copper is stronger, but still is quiet. Tin has been more active, but the range of prices is about the same.

New York

Copper.—The market has been quiet throughout the week, but it has grown firmer under the influence of renewed interest shown by domestic buyers. Yesterday sales of electrolytic were made in moderate quantity at 18.75c., cash, New York. Nothing seems to develop from the reported large foreign inquiry. The exports in May totaled 28,884 tons, against 32,077 tons in May last year. Since January 1, the exports, exclusive of Southern and Pacific ports for May, amount to 119,546 tons, against 184,312 in the same period of last year, a decrease of almost 65,000 tons. Lake copper is quoted at 19.50c. to 23c., according to grade.

Copper Averages.—The average price of Lake copper for the month of May, based on daily quotations in *The Iron Age*, was 21c., and of electrolytic 18.56½c.

Tin.—The week has been active almost continuously, with the bulk of the business in future positions, although spot has been in demand at times also. There was an active demand May 27, and 35.95c. was quoted for June shipments from the East. On the following day there were liberal sales of June and July shipments from the East at 36.15c. Yesterday about 100 tons of spot was purchased. A peculiarity of the market is that June tin is quoted as high as spot, and yesterday August delivery was held at 37c. The deliveries into consumption in May were large, amounting to 5600 tons. In stock and landing May 31 was 1425 tons. The quantity now afloat is 3140 tons.

Lead.—The manner in which the American Smelting & Refining Company has advanced its prices day after day caused a sensation. The New York quotation is now 4.90c., having advanced from 4.20c. which prevailed May 24. With the advancing prices there has been a good business, the activity having been greater than at any time in the past eight weeks. One explanation of the rise is that reserve stocks have been drawn down by the war demand, until current production is depended on for the supply. The independent producers are known to be sold out of June and July metal, and meanwhile there have been some large inquiries. The market is strong and 5c. lead is predicted by the trade. The exports in May totaled 8721 tons. The St. Louis quotation is 4.82½c.

Spelter.—There has not been much business, inasmuch as the limited supply of spelter will not permit any great activity either in prompt deliveries or futures. The market is almost entirely nominal and presents the spectacle of consumers bidding the market up on themselves in their zeal to get metal. Prime Western, prompt delivery, is quoted at 22.50c. and sales have been made at 23c. Brass mill spelter ranges from 24c. to 25c. A firm which sold 500 tons last week, for delivery in the first of next year, reports that the same sale could be made to-day at 18c. Part of the scarcity is due to the action of consumers in greatly increasing their buying beyond their needs of last year. The brass mills continue to lead the demand and in this connection it may again be said that orders for sheet brass are going a-begging. The American Brass Company adheres to the withdrawal of its prices.

Antimony.—The market continues quiet, but strong, with Chinese and Japanese quoted at 25c. to 28c.

Old Metals.—The demand is phenomenal for all material into which zinc enters, and prices are wholly nominal. Old copper is in good request and firm. Dealers are completely at sea in making quotations. Their selling prices are approximately as follows:

	Cents per lb.
Copper, heavy and crucible	17.00 to 17.50
Copper, heavy and wire	16.50 to 17.00
Copper, light and bottoms	14.00 to 14.50
Brass, heavy	12.00 to 12.50
Brass, light	8.50 to 9.00
Heavy machine composition	13.50 to 14.00
No. 1 yellow rod brass turnings	12.50 to 13.00
No. 1 red brass or composition turnings	11.00 to 11.25
Lead, heavy	3.75
Lead, tea	3.50
Zinc, scrap	15.00

Chicago

JUNE 2.—Inquiry for the non-ferrous metals has been more active and sales have been sufficient to maintain the market in its position of strength. We quote as follows: Casting copper, 18c.; Lake copper, 19c. for prompt shipment; small lots, ⅛c. to ¼c. higher; pig tin, carloads, 39c.; small lots, 41c.; lead, 4.85c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, nominally 22.50c.; sheet zinc, 25c., or price ruling date of shipment; Cookson's antimony, none obtainable; other grades, 36c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 14.50c.; copper bottoms, 13.50c.; copper clips, 14c.; red brass, 11.75c.; yellow brass, 10.25c.; lead pipe, 3.375c.; zinc, 10.50c.; pewter, No. 1, 23c.; tinfoil, 30c.; block tin pipe, 34c.

St. Louis

MAY 31.—The non-ferrous metal market continues excited. At Joplin, Mo., plans are being made for a withdrawal of zinc ore for sale until a price more in consonance with the metal market is offered by the smelter and other interests. According to the mining interests, to be in accord with the price of spelter zinc ore should command $175 to $200 per ton. The basis range for 60 per cent. zinc blende during the week was $10 higher, being $75 to $85 per ton, with the premium ores settled for at about $88. Calamine reached a record breaking hight of $61 on the basis of 40 per cent. metal, with the top price settlement at about $67. Lead ore was dull at $51. In the St. Louis market lead was quotable at the close at 4.65c. to 4.67½c.; spelter, 22c. to 23c.; tin, 44c.; Lake copper, 19.25c.; electrolytic copper, 19c.; antimony, 40c. to 45c. Miscellaneous scrap metals are quoted higher as follows: Light brass, 9.50c. to 10c.; heavy yellow brass, 11c.; heavy red brass and light copper, 12c. to 13c.; heavy copper and copper wire, 16c. to 16.50c.; pewter, 23c.; tinfoil, 33c.; lead, 3.65c.; zinc, 13c. to 14c.; tea lead, 3c.

Iron and Industrial Stocks

NEW YORK, June 2, 1915.

The shadow of complications with Germany has continued to influence the stock market unfavorably, and transactions have been light. Values have held up well, however, and such stocks as Bethlehem Steel common and those of some other companies having large war contracts actually advanced. The range of prices in active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	15⅜-16	Nat. Enam. & St., com.	15 - 16
Allis-Chal., pref.	45 - 48	Nat. En. & St. pref.	83
Am. Can, com.	34½-37½	Pressed Stl., com.	43 - 45¾
Am. Can, pref.	96¼-97	Pressed Stl., pref.	95 - 96½
Am. Car & Fdy., com.	50 - 52	Ry. Steel Spring, com.	29½-30
Am. Car & Fdy., pref.	110½-111⅝	Republic, com.	26⅞-28¼
Am. Loco., com.	44½-47¼	Republic, pref.	81½-84
Am. Loco., pref.	93¼-94¾	Rumely Co., com.	3⅝-4¾
Am. Steel Fdries	32¼	Rumely Co., pref.	10¼-11⅝
Bald. Loco., com.	45½-49	Sloss, com.	32 - 33
Beth. Steel, com.	135 -145	Pipe, com.	13⅝-15
Beth. Steel, pref.	112	U. S. Steel, com.	53½-54⅞
Case (J. I.), pref.	76 - 77	U. S. Steel, pref.	105½-106⅞
Colorado Fuel	28⅝-30½	West'gh'se Elec.	91 - 94¾
Deere & Co., pref.	90½	Am. Ship, com.	30
General Electric	150½-156	Chic. Pneu. Tool	54½-54¾
Gt. No. Ore Cert.	31 - 31¾	Cambria Steel	47½-48½
Int. Harv. of N. J., pref.	109¾-114	Lake Sup. Corp.	7½-7⅝
Int. Harv. Corp. com.	67	Cruc. Steel, com.	24¾-29
Lackawanna Stl.	41 - 44	Cruc. Steel, pref.	86 - 88
		Harb.-Walk. Refrac., pref.	97⅞

Dividends

The Peerless Motor Car Company, quarterly dividend, 1¾ per cent. on the preferred stock and 3½ additional on account of accumulated dividends of 7 per cent., payable July 1.

The Baldwin Locomotive Works, regular semi-annual, 3½ per cent. on the preferred stock, payable July 1. Action on the common dividend was postponed.

The Railway Steel Spring Company, regular quarterly, 1¾ per cent. on the preferred stock, payable June 21.

The LaBelle Iron Works, regular quarterly, 1 per cent. on the preferred stock, payable June 30.

The Standard Tin Plate Company, Canonsburg, Pa., has definitely decided to add 12 hot tin mills and 19 cold mills to its plant, which will make a total of 22 hot mills. About 20 tinning pots will also be added. The company will be in the market shortly for the necessary equipment for the new mills, including steel buildings, cranes, squaring and doubling shears and other machinery. Contracts will be placed as fast as the engineers can make the plans. The company hopes to have the new mills finished about January 1 and will then have a capacity for turning out 1,500,000 base boxes of tin plate per year.

The Heavy Hardware Convention

The sixth annual convention of the American Iron, Steel & Heavy Hardware Association was held at the St. Francis Hotel, San Francisco, May 25 to 28. About 250 members, representing all parts of the United States, were in attendance. The retiring president, E. W. A. Waterhouse, Waterhouse & Lester Company, San Francisco, in his opening address voiced the feeling of the association toward the Federal Trade Commission and its attitude toward business. He said: "The country is on the verge of one of the most interesting experiments ever attempted in governmental regulation through the agency of the new Federal Trade Commission. This commission, which is about to begin its work, enjoys unique powers of control over nearly every form of commercial production. The act provides that the commission is empowered and directed to regulate commerce by preventing the use of unfair methods of competition. These are very broad powers to be intrusted to any body of five men and it is to be hoped that the commission will be governed by the 'rule of reason' in dealing with the many thousand different kinds of commercial enterprises over whose destinies it will in a measure preside."

Reports from the various committees were optimistic in tone and there was the general feeling that the depression had passed. "Business is better in the United States to-day than it has been at any time in the last twelve months," said John G. Purdie, secretary-treasurer of the association. "The good times have returned and from now on business will be prosperous."

One of the interesting topics discussed was that of the relation of the hardware dealer, the automobile supply and repair man and the village blacksmith. It was the opinion of the members that hardware dealers should be urged to carry a complete line of automobile supplies and accessories, standardize the price, and reduce the cost of repairs to motorists by urging the blacksmith to extend his work to the repair of machinery. It was the feeling of the association that automobile owners would be better satisfied if long established hardware houses carry these supplies and standardize the price.

J. A. Gregg, Nicols, Dean & Gregg, St. Paul, was elected president for the ensuing year. Other officers were elected as follows: Vice-presidents, Henry Bodevin, H. Langer & Sons, Brooklyn, N. Y., and E. F. Yarnelle, Mossman, Yarnelle & Co., Fort Wayne, Ind.; secretary-treasurer, John G. Purdie, New York City; executive committee, R. R. Englehart, Davenport, Iowa, Herbert Field, Providence, R. I., Eugene J. McCarthy, Buffalo, N. Y., and George S. Scovil, San Francisco. Pittsburgh was chosen as the next meeting place.

Making Ferromanganese in California

The Noble Electric Steel Company, San Francisco, H. H. Noble, president, and C. B. Morgan, secretary, is now operating three of its eight furnaces. It is specializing on ferromanganese and ferrochrome, which it feels it has a special opportunity to supply, with the present condition of the market. The manganese ore is obtained four miles from the company's electric furnaces on the Pitt River in northern California. Its ferromanganese capacity is about 35 to 40 tons a day. The freight charge to Atlantic seaboard is about $11 a ton.

The New York, Ontario & Western is inquiring for 12 Santa Fé type locomotives; the Texas & Pacific, for 10 switching and 6 freight locomotives, and the Havana Central for 6 consolidation type locomotives. The Chesapeake & Ohio is reported to have ordered 24 locomotives from the American Locomotive Company, and the Western Maryland 15 Mallet type from the Lima Locomotive Corporation.

The Western Steel Car & Foundry Company, Hegewisch, Ill., which has recently taken orders for 2000 cars for the Chicago & Northwestern and 1600 for the New York Central, announces that its plant will be operating on full time this week with 4000 employees.

Steel Men Look Forward to Better Things

(Continued from page 1245)

fluence of all similar addresses from the presidential chair. The growth of the institute was significant, he thought, citing the fact that with 1230 active members the limit of 1250 in that class had now nearly been reached. Mr. Penton referred to the changing sentiment in high places toward business, and expressed wonder that there should ever have been such an attitude toward the steel industry as had been manifested in some inquisitions and prosecutions when one considered the tremendous advance made in caring for the interests of employees, the high wages paid, and the vast outlays made in the kind of work described by Dr. Noland, representing the creation of a new spirit in the industry.

WHY NOT A STEEL TRADE PROPAGANDA?

Edward M. Hagar, president of the Hagar Cement Company, made a highly commendable departure from some of the institute's after-dinner talks in suggesting a field of effort upon which the organization might enter with great profit. Asking the question how much the steel trade of the United States was doing to promote the use of its products and to find new markets, he said that if the steel manufacturers kept pace with the cement manufacturers in such educational work they would spend not less than $12,000,000 a year in this way, basing the comparison on the value of outputs in the two industries. The cement manufacturers had found that their expenditures of this sort had come back to them many fold. The speaker asked how many steel manufacturers were using steel furniture in their offices. He called attention to the efforts of cement manufacturers to further the use of concrete in road making. In all such work the wider roads would require steel reinforcing. In this and in other propaganda manufacturers of steel and of cement might well co-operate, and he suggested the appointment of a joint committee of cement manufacturers and steel manufacturers to work together for the benefit of the two industries.

MR. SCHWAB CALLS FOR CO-OPERATION

Charles M. Schwab, who never escapes when Judge Gary is making his after-dinner calls, spoke first of the presidential address at the day session, pronouncing it the best utterance he had ever heard on the relations of government and business and kindred subjects—"a speech that well reflects the opinions of this great organization at a time when such sentiments need to be uttered." Judge Gary has been talking for a number of years about co-operation; President Wilson has favored co-operation in the export trade; now the time has come for "us, the minor people in the steel industry," to take steps to make co-operation real and to reap the benefit of the changed sentiment in the country toward business. What the cement men have done to further that industry indicates well what the steel manufacturers should undertake. Referring to business conditions the speaker said that the situation is one in which some concerns want orders, some are getting orders and some have orders thrust upon them. The time is coming, after all these years of bad business, when all will have orders thrust upon them. The lean years will certainly be followed by years of prosperity. One of the greatest fruits of the movement represented by the institute, Mr. Schwab considered to be the fellowship it had fostered. This spirit would continue to cement the membership closely in the bonds of friendship and of business success.

James H. Hoyt, the last of the evening's speakers, considered that the influence of two persons had been important in a high degree in bringing about the changed sentiment of the nation regarding business and business men. One is the president of the American Iron and Steel Institute, whose sanity, fairness and courtesy have stood out in all his utterances, and who has constantly pointed out that the country cannot be prosperous unless its captains of industry are encouraged to go forward and capital is given inducements to invest. The other is the best ex-president the country has had since George Washington. The time has now arrived when attacks on business—honest, well-managed and aggressive business—are recognized to have been a grievous error. That error, it is to be hoped, has received its body blow.

Judge Gary read a wireless telegram of greeting from President Farrell of the Steel Corporation, who was on the Pacific en route for New York. In reply a telegram of good wishes was voted and sent.

New Institute Members

The following have been elected to membership in the American Iron and Steel Institute:

Active Members

Charles Benton Cushwa, general superintendent Youngstown Iron & Steel Company, Youngstown, Ohio.
William W. Holloway, assistant to president Whitaker Glessner Company, Wheeling, W. Va.
Myron S. Curtis, chief inspector Youngstown Sheet & Tube Company, Youngstown, Ohio.
G. T. Schnatz, sales agent, Lukens Iron & Steel Company, Philadelphia.
Albert J. Thomas, salesman, American Sheet & Tin Plate Company, New York.
R. W. H. Atcherson, blast furnace superintendent Carnegie Steel Company, Clairton, Pa.
Joseph R. Thomas, assistant treasurer American Steel & Wire Company, New York.

Associate Members

Carl H. Booth, vice-president Snyder Electric Furnace Company, Chicago.
David L. Eynon, general superintendent Seaman-Sleeth Company, Pittsburgh.
James O. Handy, director of chemical laboratories, Pittsburgh Testing Laboratory, Pittsburgh.
Ernest Hillman, J. H. Hillman & Sons Company, Pittsburgh.
William G. Hurlbert, president and treasurer, Bostwick Steel Lath Company, Niles, Ohio.
Walter O. Janssen, steel foundry superintendent, Bettendorf Company, Bettendorf, Iowa.
John Everett Bell, consulting engineer, New York.
Weaver H. Rogers, vice-president Pittsburgh Iron & Steel Foundries Company, Midland, Pa.
J. M. Andrews, electrical engineer General Electric Company, Schenectady, N. Y.
Franklin M. Bowman, vice-president Blaw Steel Construction Company, Pittsburgh.
John E. Greenawalt, metallurgist, New York.
Robert C. Lea, Robert C. Lea & Co., Philadelphia.

The Master Boiler Makers' Association held its ninth annual convention at the Hotel Sherman, Chicago, May 25 to 28, with an unusually large attendance. Among the topics to which particular attention was given was the relative advantage of the oxy-acetylene and electric welding processes in connection with the maintenance and repairs of locomotive boilers. The secretary of the association is Harry D. Vought, 95 Liberty street, New York.

The Crane Fence Company, Cleveland, Ohio, has succeeded the Cleveland Wire Fence Company and is located at 5407 Sweeney avenue. The company makes a specialty of electro-galvanizing. R. J. Crane is the manager.

Iron and Steel Wages and Hours

The United States Bureau of Labor Statistics has issued Bulletin 168, which treats of wages and hours of labor in nine departments of the iron and steel industry of the United States for the year 1913. This is in continuation of Bulletin 151, data from which are incorporated for comparison, thus presenting a complete statement as to rates of wages per hour, hours of labor per week, and full-time weekly earnings from 1907 to 1913 for three departments, and from 1910 to 1913 for six departments. The report is based on data for May in each year, obtained from the payrolls of representative establishments in the various centers of the industry.

A marked increase in the rates of pay in the iron and steel industry was made in the early part of 1913. As a result, in three departments for which reports for seven years have been obtained—blast furnaces, Bessemer converters, and bar mills—full-time weekly earnings in 1913, as shown by a combination of earnings in the principal productive occupations, were from 6.6 to 26.4 per cent. higher than in any one of the six years preceding. In the remaining six departments covered by the report—open-hearth furnaces, blooming mills, plate mills, standard rail mills, sheet mills, and tin-plate mills—for which reports have been obtained back to 1910 only, full-time weekly earnings in 1913 were from 3.8 to 18.3 per cent. higher than in any one of the three years preceding. Wages per hour in 1913 showed even a greater per cent. of increase over 1907 or 1910 than weekly earnings, as the latter were materially affected by the reduction in hours of labor. In the selected occupations combined, for the blast-furnace, Bessemer, and bar-mill departments, there was a reduction in hours of labor per week of from 1.6 to 2.9 per cent. between 1907 and 1913, and, except open-hearth furnaces and plate mills, all departments showed a reduction in hours between 1910 and 1913.

There was a marked decrease in seven-day work between 1907 and 1913, many establishments having put into effect a plan whereby relief gangs were provided to give each employee in seven-day occupations one day of rest in each week. The proportion of seven-day workers in the principal productive occupations of blast furnaces fell from 97.2 per cent. in 1907 to 79.8 per cent. in 1913—a reduction of 17.4 per cent. In the Bessemer converting department, the reduction of seven-day workers was from 24.1 per cent. in 1907 to 10.8 per cent. in 1913, or 13.3 per cent. At open-hearth furnaces the proportion of seven-day work varies according to the volume of business; and in this one department there was a slight increase, or 2.1 per cent. in 1913 as compared with 1910. In blooming mills there was a reduction of 5.5 per cent. between 1910 and 1913, and in other departments the proportion of seven-day work is very small.

The wide range of full-time weekly earnings in the iron and steel industry is shown by the following list, including a few of the unskilled, semi-skilled, and skilled occupations for 1913, selected from the various departments:

Blast furnaces:		Blooming mills:		Bar mills:	
Laborers	$12.43	Bottom makers' helpers	$19.33	Bundlers	$14.05
Keepers	19.13	Manipulators	27.60	Roughers	26.00
Blowers	26.84	Heaters	44.18	Rollers	60.71
Bessemer converters:		Plate mills:		Sheet mills:	
Mold cappers	$20.28	Shearmen's helpers	$17.47	Openers	$12.56
Steel pourers	33.94	Tablemen, sheared	21.35	Doublers	19.21
Vesselmen	41.00	Screwmen, sheared	33.36	Sheet heaters	42.60
Open-hearth furnaces:		Standard rail mills:		Tin-plate mills:	
Stockers	$15.30	Hot bed men	$15.01	Screw boys	$15.91
Stopper setters	27.78	Table levermen	27.51	Catchers	18.23
Melters' helpers, first	33.80	Rollers	50.18	Shearmen	30.66

A similarity in earnings by no means indicates a similarity in full-time weekly hours; for example, it will be noticed that blast-furnace keepers and sheet-mill doublers have almost identical full-time weekly earnings, but the working time for these earnings differs greatly in the two occupations, the average full-time hours per week of keepers being 81.9, while that of doublers is only 42.7.

The rate of wages paid common laborers is to a large extent a basic rate from which are determined the rates for other occupations requiring little skill, hence the rate for common labor is of importance beyond the limits of the occupation proper. The rate per hour is practically the same in all departments of a plant, but the earnings per day or week, of course, are determined by the number of hours worked. The average rate per hour of laborers in 1913 in the nine departments covered by this report was $0.183, while the average full-time hours per week ranged from 61.1 to 76.2, and the average full-time weekly earnings from $11.51 to $14.38.

Ruling on Demurrage Liability

WASHINGTON, D. C., June 1, 1915.—An important ruling regarding demurrage liability, applying alike to all carriers and consignees, is embraced in a decision of the Interstate Commerce Commission in the case of the Ohio Iron & Metal Company, scrap dealer, Chicago, vs. the Elgin, Joliet & Eastern Railway Company. The commission holds that a shipper cannot compel the carrier to waive demurrage charges assessed for failure to unload cars within the required period because of the fact that the notice of arrival of car, duly written and mailed by the agent of the carrier, was not received by the addressee.

Shipments of scrap purchased by the complainant are consigned to it at a designated point, and on their arrival it gives an order for delivery to its customers at the same point or for reconsignment. Witnesses for the complainant testified that it was the practice of the carrier to give immediate notice of the arrival of the shipments, following with written request for disposition orders in case such orders were not given promptly after the initial notice, and that complainant was prepared to dispose of the particular carload involved in this case immediately upon arrival. In the case of this shipment, which reached Chicago Heights November 14 or 15, the complainant declares that no notice whatever was received in connection with the car involved until January 16 following, for which period carrier assessed the consignee at the rate of $1 per day.

A witness for the carrier, whose duty it was to advise consignees of the arrival of cars at the time the shipment was received, testified that in accordance with the general custom he had sent complainant formal notice of the arrival of the car upon the day thereof. He was unable to produce a copy of the notice, but offered in evidence the carbon copy of a letter addressed to the complainant, dated three days later, containing advice that the car had been received. He testified that he had written this letter and that although he had not mailed it himself it had taken the regular course of other correspondence out of the office and that in the regular course of business it would have been placed in the mail on the day it was written.

In deciding this case against the complainant, the commission quotes the carrier's demurrage tariff, which provides as follows:

> Consignee shall be notified by this railroad agent in writing, or as otherwise agreed to by this railroad and consignee, within 24 hours after arrival of cars and billing at destination, such notice to contain point of shipment, car initials and numbers, and the contents, and, if transferred in transit, the initials and number of the original car. In case car is not placed on public-delivery track within 24 hours after notice of arrival has been sent, a notice of placement shall be given to consignee. On cars held for orders time will be computed from the first 7 a.m. after the day on which notice of arrival is sent to consignee.

Upon the evidence the commission finds that the defendant carrier actually "placed in the mail a letter properly addressed to complainant advising him of the arrival of the car involved; that the mailing of this letter fully discharged defendant's duty under its tariff and that the demurrage charges of $1 per day were properly imposed." W. L. C.

The Tropenas Converter Company, 50 Church street, New York, is erecting an office and laboratory building of its own in Brooklyn. All chemical and metallographical equipment has been arranged for, while the machinery for the physical testing plant will be purchased in a few days. Sufficient ground has been provided to erect a small experimental plant in the near future. In this plant will be perfected a novel steel producing method which will be put on the market at an early date.

PERSONAL

Arthur Putnam Scott has been appointed head of the metallurgical department of the Snyder Electric Furnace Company, Chicago. Mr. Scott's first connection in the steel industry was with the Dominion Iron & Steel Company, Sydney, Nova Scotia. Graduating from McGill University, Montreal, in 1898, having received the Logan gold medal for natural sciences and the

ARTHUR P. SCOTT

British Association medal in chemistry and metallurgy, he remained at the university as a demonstrator in chemistry until the spring of 1899. Then he became assistant chemist with the Dominion Company and was made chief chemist and assistant metallurgist in 1904. In 1908 he entered the service of the General Electric Company as representative metallurgist at the Brackenridge plant of the Allegheny Steel Company. In 1911 he was recalled to Sydney as metallurgist and superintendent of the steel department of the Dominion Iron & Steel Company. In February, 1915, he severed this connection and took up consulting work with headquarters in Montreal. In the course of his work Mr. Scott has spent considerable time at European steel plants.

Clyde M. Carr, president Joseph T. Ryerson & Son, Inc., Chicago, has returned from his stay at Santa Barbara, Cal.

C. H. Morse, Sr., has retired from the office of president of Fairbanks, Morse & Co., Inc., Chicago, which he had held for 24 years, and C. H. Morse, Jr., was elected to succeed him. C. H. Morse, Jr., has for a number of years been president of the Fairbanks-Morse Mfg. Company, Beloit, Wis., which office he will continue to hold. The other officers of the company were re-elected.

John M. Studebaker, sole survivor of the five brothers who founded the Studebaker Bros. Mfg. Company, now the Studebaker Corporation, will shortly retire and be succeeded as chairman of the board by Frederick S. Fish, who has been president of the company. Mr. Studebaker is 83 years old. Vice-President Erskine will succeed Mr. Fish as president.

George C. Wilson, Independent Pneumatic Tool Company, Chicago, Ill., has been appointed manager of that company's branch at Atlanta, Ga., succeeding F. H. Charbono, transferred to Boston.

H. V. Lewis, formerly president H. V. Lewis Company, and now connected with the Allied Machinery Company of America, New York, sailed June 1 for Europe. He will be attached to the Paris office of the company.

G. M. Haardt, of Citroen & Co., Paris, who has been in this country making purchases of machine tools, sailed for France June 1.

George Aubrey, of the Fitchburg Machine Works, Fitchburg, Mass., sailed for Europe May 29. He will make his headquarters at the Paris office of the Allied Machinery Company of America.

E. W. Swartwout of the Chicago office of the Nordberg Mfg. Company has become associated with N. M. MacLaren of the New York office, 120 Broadway. The Chicago office in the future will be in charge of John E. Lord.

H. M. Easton, formerly manager of sales of the Pope Tin Plate Company, prior to its being taken over by the Phillips Sheet & Tin Plate Company, and later with the Impervious Sheet Steel Company, Pittsburgh, in the same capacity, has resigned to accept the position of special agent of the Phillips Sheet & Tin Plate Company, with headquarters at its general offices at Weirton, W. Va.

Frank J. Lanahan, president Fort Pitt Malleable Iron Company, Pittsburgh, has been elected a director of the Pittsburgh Industrial Development Commission, succeeding W. H. Donner, president Cambria Steel Company, who recently resigned as president and director of the commission, owing to press of private business and removal from Pittsburgh. Mr. Donner continues as a member of the commission, and Mr. Lanahan becomes president, serving until the annual election.

David Dows, vice-president Naylor & Co., Inc., New York, has returned from a four months' stay in England.

W. Deutsche, manager of the Seattle office of Joseph T. Ryerson & Son, has returned to Chicago, where he was for some years identified with the head office of the house. The Seattle office has been closed for an indefinite time.

C. F. Rand, president Spanish-American Iron Company, has returned from a month's stay at the company's properties in Cuba.

Pittsburgh and Nearby Districts

The William Tod Company, Youngstown, Ohio, has an order from the Frankford Arsenal for supplying forgings for and machining a large number of 4½-in. high explosive shells, and is completing another order for the War Department for 3-in. shrapnel parts. The report that the company has enough orders on hand from the Government for war materials to keep its plant operating until April, 1916, is strongly denied by an official of the company.

At Pittsburgh last week, David J. Simpson and Dennis K. Bullens, former employees of the Carbon Steel Company, were convicted of conspiracy in connection with material furnished by that company for the Panama Canal. It was proved that officials of the Carbon Steel Company had no knowledge that any defective material was being furnished.

No. 2 Carrie furnace of the Carnegie Steel Company, at Rankin Station, Pittsburgh, was blown in last week, and all seven furnaces at that plant are now in blast. The company is now operating 41 out of 59 blast furnaces. Another Edgar Thomson will soon be in.

L. C. Wilkoff, secretary of the National Enameling & Mfg. Company, Youngstown, Ohio, whose plant was damaged to the extent of about $50,000 by fire recently, states it will rebuild, but until definite plans are made the company will not know what new machinery will be needed.

On Tuesday evening, June 1, R. S. Lord, vice-president Hope Engineering & Supply Company, Pittsburgh, read a paper on "Pipe Couplings" before the Mechanical Section of the Engineers' Society of Western Pennsylvania in its rooms in the Oliver Building, Pittsburgh.

OBITUARY

SAMUEL D. MCCULLOUGH, formerly assistant manager of the McCullough Iron Company, which has mills at North East, West Amwell and Rowlandville, Md., died May 28 at his home near Elkton, Md., aged 59 years. He learned the trade of machinist, then went West and for some years lived on a Wyoming ranch. In 1882 he returned to Maryland and became assistant manager of the business which was founded by his father, Enoch McCullough.

JOSEPH HEIBLER, superintendent of the local plant of the American Bridge Company for a number of years, died at his home in Milwaukee, Wis., May 22, aged 58 years. Under his supervision many of Milwaukee's large buildings were erected, including the city hall and the plant of the Allis-Chalmers Mfg. Company. He was born in Prescott, Wis., and settled in Milwaukee in 1880. He leaves his widow and six sons.

JOSEPH S. MUNDY, inventor of the Mundy friction drum hoisting engine, and a manufacturing machinist, died May 26 at his home in Newark, N. J., aged 69 years. He was born in Rahway, N. J., became a machinist, bought an interest in the business in which he was employed, and eventually became sole owner. He leaves his widow and a son.

JAMES C. HAYDON, pioneer anthracite operator and founder of the Jeanesville Iron Works, died at his home at Jeanesville, Pa., May 27, aged 81 years. He disposed of his mining properties to the Lehigh Valley Coal Company some years ago, and sold the iron works to the International Steam Pump Company. He leaves his widow and two daughters.

FRANK M. MADDEN, president Madden-Morrison File Company, Middletown, N. Y., died at Saranac Lake, N. Y., May 24. He succeeded his father, the late Isaac P. Madden, who was one of the pioneer filemakers in this country. He leaves his widow, a son and a daughter.

Lake Superior Iron & Chemical Affairs

Plans for the reorganization of the Lake Superior Iron & Chemical Company and removal of the receivership, under which the company has operated since October 30, 1913, are about completed. The details were worked out under direction of Frank W. Blair, receiver and president Union Trust Company, and former chairman of the iron company's board of directors.

The new company is to be named the Charcoal Iron Company of America. It will have a capital stock of $7,989,600, comprising $5,183,750 of 6 per cent. cumulative preferred and $2,805,850 of common. The incorporators, who also constitute the reorganization committee, prepared to purchase the assets of the iron company when offered for sale at Marquette in foreclosure proceedings about July 1, comprise John W. Mitchell, Toronto; Frank W. Blair, Henry H. Bingham, Frank W. Hutchings, Henry M. Campbell and Harry Slater, all of Detroit, and George J. Webster, Marquette.

The new company has elected officers as follows: President, Frank W. Blair; vice-president, John W. Mitchell; treasurer, Frank W. Hutchings; secretary, Henry H. Bingham; general manager, George J. Webster.

May Lake Superior Ore Shipments

CLEVELAND, OHIO, June 2, 1915—(*By Telegraph*).—Lake Superior iron ore shipments in the month of May were 5,012,357 gross tons, as compared with 3,852,063 tons in May, 1914.

The Cleveland Ball Bearing Company, Cleveland, Ohio, maker of ball bearings for automobiles, is purchasing considerable new equipment, which, when installed, will give the company's plant three times its present capacity.

BRITISH BARS GO TO FRANCE

Large Increase This Year—Imports Fall Off, Manganese Ore 56 Per Cent.

The iron and steel exports of Great Britain for April of this year and for the first four months to May 1 show a decrease in tonnage and in value, comparing with corresponding periods of 1914. The total exports last April, excluding iron ore and scrap, were 260,857 gross tons against 385,334 tons for April, 1914, a decrease of 124,477 tons or about 32 per cent. The decrease for the first four months was from 1,591,769 tons to May 1, 1914, to 916,405 tons to May 1, 1915, or 42 per cent. The falling off in values was £6,139,165, or from £17,164,487 to £10,925,322. In pig iron the April movement was 29,746 tons, compared with 84,333 tons in the same month in 1914. The exports of pig iron to May 1, 1915, were 84,272 tons, against 293,869 tons to May 1, 1914, a decrease of 72 per cent.

The exports of steel bars increased, in contrast with all other products. For April, 1915, the total exports were 44,991 tons, compared with 17,512 tons in April, 1914, an increase of 27,479 tons. France took 34,069 tons, as compared with only 316 tons in April, 1914. To May 1, 1915, the total exports of steel bars were 146,649 tons, compared with 73,080 tons to May 1, 1914, an increase of 73,569 tons, or over 100 per cent. Of this large total France took 105,027 tons, against only 1462 tons to May 1, 1914. The exports of steel bars to all other countries showed a decrease.

The exports of galvanized sheets were 31,408 tons for April this year, or 32,204 tons less than for April, 1914. The falling off for the first four months was 166,685 tons, or 60 per cent., the exports to May 1, 1915, being only 110,797 tons.

Exports of ferromanganese in April, 1915, were about 5400 gross tons, compared with 9000 tons in April, 1914, indicating a resumption of shipments to this country. Imports of manganese ore in April were only 877 tons, against 8641 tons in April, 1914. The decrease of manganese ore imports was from 25,375 tons up to May 1, 1914, to 11,291 tons up to May 1, 1915, or 56 per cent.

Imports of iron and steel, excluding iron ore and scrap, in April, 1915, were 66,081 gross tons, against 217,629 tons in April, 1914, a falling off of 151,548 tons, or about 70 per cent. To May 1, 1915, the total imports were only 227,813 tons, compared with 749,358 tons to May 1, 1914, a decrease of 521,545 tons, or nearly 70 per cent. The values to May 1, 1915, and 1914, were £5,006,921 and £2,060,454 respectively, a decrease of £2,946,467, or 58.9 per cent.

Of iron ore the imports for April were 586,317 gross tons, compared with 512,904 tons in April, 1914. This is an increase of 73,413 tons, which is a good showing in the present condition of British shipping. To May 1, 1915, however, a decrease in iron ore imports is shown, from 2,070,224 tons to 1,881,440 tons. Imports of crude zinc were 5450 gross tons for April, 1915, against 6472 tons for April, 1914.

New Shipbuilding Plant at Mobile

Edward W. Hyde, former president of the Bath Iron Works, Bath, Me., announces the intention of himself and associates to establish a shipbuilding plant at Mobile, Ala., to be ready for work within a year. The steel plates are to be obtained from Birmingham, Ala. Mobile was selected because of its splendid harbor, good climatic conditions and nearness to cheap raw materials.

The Wheeling Stove & Range Company, Wheeling, W. Va., has opened a branch office at 50 Vestry street, New York, with C. N. Cumberland as manager. A full line of gas ranges, heating stoves, hot plates, ovens, water heaters, etc., will be on display.

The offices of the John Macnab Machinery Company were removed June 1 from 154 Chestnut avenue, Jersey City, N. J., to 90 West street, New York.

Machinery Markets and News of the Works

SUSTAINED DOMESTIC DEMAND

All Sections of Country in Market

Plants Being Bought for Their Tools—War Business Continues — Demand for Lathes Increasing

Reports received from all sections of the country indicate that the demand for metal-working machinery is good. This applies not alone to those tools that are required for the production of shrapnel, but to practically all lines as well. The questions of delivery and the shortage of operatives are still important. A feature of the trade throughout the country is the inquiry for small numbers of machines and as a rule even these cannot be filled. At Chicago the effort to secure tools for both domestic and foreign business has resulted in the purchasing of a number of plants from which the machines are removed. Throughout the South the number of new industrial enterprises that are being started has created a call for machine tools. The labor situation in New England is unrelieved and this problem has caused an increased demand for lathes at New York, due in part to the fact that it is possible to secure operatives for this type of tool easier than for others. In addition to the inquiries for machinery for making shrapnel, several crane inquiries are before the New York trade. Hydraulic presses for making powder and machines for piercing and drawing shells are also in demand. Some of the larger New England companies have men traveling from place to place advertising for operatives and also hiring men where possible to do so. Second-hand machinery is a feature of the Detroit market, and good volumes of orders are reported by manufacturers of machinery and tools. Conditions in the Cleveland foundry trade continue good and automobile builders are buying freely, but round lots of machines are no longer sought. An improvement in domestic business is reported at Cincinnati, and while no additional orders for shrapnel were placed in the past week, it is understood that more are pending. Business in the Pacific Northwest is good, due to a revival of activity in the mining and smelting fields and the opening of the Alaskan season.

New York

NEW YORK, June 2, 1915.

The increased number of companies which have contracts for war materials, and more particularly of those which can have them providing they can get the necessary equipment, has created a fresh spurt in both inquiry and demand. Deliveries continue to be almost the sole factor in control of business. Both factory representatives and large dealers are sold out of practically all machines. In one or two cases reservations of a few machines have been made, and now and then a machine is squeezed out for domestic buyers, but the latter, as a rule, are being disappointed. Inquiries for one to three machines continue to come out in good number.

The demand for lathes is growing rather than decreasing, partly because operatives for them can be more easily obtained than can operators of other machines. Some large orders for turret lathes are seeking placement, so far without success inasmuch as the intending buyers do not want to wait several months for the machines.

The J. L. Mott Company, Trenton, N. J., which has a contract for shrapnel fuse timers, has placed an order for 200 1-in. turret lathes, dividing the order among three makers. The Poole Engineering & Machine Company, Baltimore, is in the market for several automatic screw machines. The General Electric Company, Schenectady, has done some heavy purchasing. The Baldwin Locomotive Works inquiry is still pending. A pneumatic tool company is seeking delivery on a large number of machines for shrapnel making, so far without much success. The American Locomotive Works has issued another large inquiry, supplemental to the large lot already bought. The American Car & Foundry Company and the Crucible Steel Company of America have continued to buy on a large scale. In addition to metal-working machinery, the latter company, whose new plant at Harrison, N. J., is well under way, some of the steel work already being erected, has bought 16 cranes. They will be supplied by the Morgan Engineering Company, Alliance, Ohio, and include seven 5-ton, four 25-ton, three 50-ton, one 15-ton and one 20-ton cranes.

Makers of hydraulic presses have booked orders which put their deliveries far ahead. Powder presses and machines for piercing billets and drawing shells are chiefly in demand. Forging machines have been in good demand also, and among the buyers have been some of the railroads.

The Raritan Copper Works, Perth Amboy, N. J., is in the market for a 15-ton crane. There are a number of attractive inquiries for cranes before the trade, but they are somewhat slow in closing.

The Pequannock Rubber Company, Butler, N. J., has filed plans for a brick addition to its factory to cost about $100,000. Joseph F. McLean is president.

The National Red Oil & Soap Company, Essex and First streets, Harrison, N. J., manufacturer of leather and textile oils, is erecting a steel and hollow tile addition.

The Pathe Freres Phonograph Company, 29 West Thirty-eighth street, New York, has leased the plant of the Dielectric Company of America at Belleville, N. J., where it will manufacture discs. No change is contemplated in the equipment.

The Eagle Specialty Mfg. Company, Jamestown, N. Y., has taken over the City Hall Square plant of the former Jamestown Bracket Company, together with its business, patents, etc., and will manufacture a line of mop holders, steel sink brackets, shelf, laundry tray frames, etc. Arthur Westburgh is president, and J. Irving Price is superintendent.

The Elite Furniture Company, Jamestown, N. Y., has awarded contract for the construction of a four-story factory, 54 x 112 ft., which it plans to occupy about September 15. It has purchased power apparatus and will not buy other machines until that time. Axel E. Bloomquist is superintendent.

The Bossert Company, manufacturer of sheet metal stampings, Utica, N. Y., has recently completed a new building and has increased its welding equipment about 100 per cent. It is also erecting a one-story building 25 x 100 ft., to be devoted to the finishing of pressed steel parts. The equipment of this department will be increased by a number of special lathes, drill presses, etc. J. R. Jones is general manager.

The Ludlum Steel & Spring Company, Watervliet, N. Y., will build an addition to plant No. 1 at Colonie, of steel and iron, 80 ft. square, to be used as a melting shop. The Berlin Construction Company, Berlin, Conn., is the contractor.

The Enkel Motor Company, Auburn, N. Y., has been incorporation with a capital stock of $100,000. It is manufacturing a Diesel type automobile motor. The building of a factory will be taken up after October 1, at which time the company expects to be in the market for special machine tools and patternmaker's tools. C. A. Thomas is president; C. Howard Williams, vice-president and general manager, and Carl Dellgren, treasurer and chief engineer.

The South Brooklyn Die Machine & Tool Company, has been incorporated with a capital stock of $25,000 by J. and A. Gustafson and N. Holmgren, 5203 Ft. Hamilton avenue, Brooklyn, N. Y., to manufacture presses, dies and machinery. The company plans to start a factory near the Bush Terminal. Nils Holmgren is president and treasurer.

The American Radiator Company, Buffalo, has let contract for the erection of a one-story foundry and coal storage building, 222 x 234 ft., of steel and brick construction, to be added to its plant at Elmwood and Hertel avenues and the New York Central Railroad Belt Line.

The Municipal Lighting Company, Mt. Kisco, N. Y., has been incorporated with a capital stock of $100,000 to manu-

facture electricity, gas, etc. R. Roome, J. Lennox Banks, Jr., and J. Zeppa, 110 West 124th street, New York City, are the directors.

The Cadwell-Vernon Company, Jamestown, N. Y., has been incorporated with a capital stock of $100,000 to manufacture metal and wood furniture, etc. E. S. and John Cadwell and W. C. Price are the incorporators.

The Gould Storage Battery Company, Depew, N. Y., has awarded contract for the erection of an addition to its plant, 75 x 200 ft., two stories, to cost about $40,000.

The Schoellkopf Hartford Hanna Company, Buffalo, has let contract for erection of an addition, 75 x 175 ft., three stories, of brick and steel to its plant at Abbott road and the Lake Shore Railroad for the manufacture of aniline dyes. It intends to triple its output as the result of the war. It has ordered a compressed air unit from the Nordberg Company, Milwaukee, as part of the new equipment required.

The General Electric Company, Schenectady, has put out a new inquiry list for machines, including a dudgeon press.

The Columbia Rope Company, Auburn, N. Y., is building two one-story additions to its plant to cost $35,000. The general contract has just been let.

The Rochester Blanking Company, Inc., Rochester, N. Y., has been incorporated with $100,000 capital stock to manufacture boxes, cartons, etc., of paper, cardboard, fiber, etc. H. E. Kondolf, J. E. Miller and A. R. Turner, Rochester, are the incorporators.

The capital stock of the Oswego Falls Pulp & Paper Company, Fulton, N. Y., has been increased from $30,000 to $600,000. Its plant will be enlarged by the addition of two extensive buildings.

Bids are being received by John B. Riley, Superintendent of Prisons, Albany, for refrigeration equipment for the storehouse at the Matteawan State Hospital, Beacon, N. Y., from plans of state architect Lewis F. Pilcher.

The Richfield Springs Milling Company, Inc., Richfield Springs, N. Y., has been incorporated to do a general milling business. L. M. and T. A. Wilson, 702 Press Building, Binghamton, N. Y., and L. S. Raymond, Richfield Springs, N. Y., are the incorporators. The capital stock is $30,000.

The Automobile-Aviation Industries Company, Buffalo, N. Y., recently incorporated, has plans in preparation for the erection of a factory. H. F. Hanford, 322 Pennsylvania street, is secretary.

The Special Metals Company, Elmira, N. Y., has been incorporated with $250,000 capital stock to manufacture castings, appliances and products of special metal, by C. and C. S. Lattin and H. H. Mills, 1211 Grand Central avenue.

The Empire Axle Company, Dunkirk, N. Y., is working at full capacity with a night and day force as a result of large orders from abroad recently received for its product for use on heavy motor trucks.

The Buffalo Copper & Brass Rolling Mill has purchased additional land, 220 x 1200 ft., adjoining its present plant at Military road and New York Central Railroad, upon which extensive additions will soon be built. The company is now building additions, 56 x 454 ft., 24 ft. high, and 65 x 165 ft., 40 ft. high, of brick and steel, in the rear of its present buildings.

Signor Fuzak, 867 Jefferson street, Buffalo, will build a one-sfory machine shop of concrete block for automobile repairs and general machine shop work.

The Ronkonkoma Water Company, Brookhaven, N. Y., has been incorporated by Isaac N. Parmenter, Willard D. Howe and Allston B. Carpenter, of New York City. The capitalization is $30,000.

Philadelphia

PHILADELPHIA, PA., May 31, 1915.

The United Roofing & Mfg. Company, Morris Building, Philadelphia, has had plans drawn for a group of seven factory buildings, from one to three stories, to be erected at its plant at Marcus Hook, Pa., at a cost of $125,000, as follows: 23 x 43 ft., 25 x 112 ft., 70 ft. square, 30 x 80 ft., 56 x 210 ft., 56 x 136 ft., and 100 x 200 ft., all of brick and concrete. Construction bids were to be called on May 25.

A. H. & F. H. Lippincott, manufacturers of soda-water apparatus, Twenty-fourth and Locust streets, Philadelphia, are having plans drawn by Mahlon H. Dickinson, Empire Building, Philadelphia, for a four-story reinforced concrete factory, 110 x 190 ft., including a power plant.

John G. Brown, Witherspoon Building, Philadelphia, Pa., engineer, has drawn plans for a one-story brick, steel and concrete addition, 116 x 120 ft., with ell 30 x 60 ft., for the plant of the International Motor Company at Plainfield, N. J.

The Fleetwood Metal Body Company, Fleetwood, Pa., has had plans drawn by Wayne High, 416 Penn street, Reading, Pa., for a two and one-half story brick and concrete factory, 40 x 499 ft. Sub-bids will be taken in about three weeks.

The proposed plant of the Klauder-Weldon Dyeing Machinery Company, Amsterdam, N. Y., will be erected at Chester, Pa., at an approximate cost of $75,000. It will be one and two stories, 150 x 350 ft., of brick and steel. The architects, Peuckert & Wunder, 310 Chestnut street, Philadelphia, will take bids in about two months.

The Wildman Mfg. Company, Norristown, Pa., manufacturer of knitting machines, will build an addition to its foundry, 50 x 60 ft., to take care of its increased business.

William F. Taubel, Inc., Riverton, N. J., is having plans drawn for hosiery mills at Camden and Trenton, 50 x 120 ft., and 50 x 150 ft., respectively, both three stories. W. U. Jury, Shamokin, Pa., is the architect.

New England

BOSTON, MASS., June 1, 1915.

The Memorial Day week-end came as a much appreciated interim from work for many manufacturers of metal products, and for a very much larger number of their employees who have been working overtime for weeks. In rare cases only were employees asked to labor yesterday.

General business shows no signs of abatement. The textile manufacturing industry has improved considerably. This business is spotty; but this is always the case in the woolens, and, excepting in rush times, in the cottons, outside of the staples. The average has changed much toward better conditions. This is reflected in the textile machinery industry, which—again using the average—is increasing constantly in volume of orders and even more in volume of inquiries. The shoe manufacturers report a somewhat better business.

As for business directly traceable to the war, there seems to be no end of it. The influence of the great orders for materials is extending in every direction. It would be impossible to itemize it, because it seems to reach almost everywhere. For example, one only has to imagine a lot of cartridges to realize that they must have boxes. The wire people are making a large tonnage of armored electric wire for the telephone systems of the trenches. Barb wire is being produced in enormous quantity. Cartridge belts are being made as fast as they can be produced, as is illustrated by the fact that the Mills Woven Cartridge Belt Company, Worcester, is building a large addition.

The problem of labor is becoming more and more serious. Manufacturers who are not yet busy are beginning to realize the fact and are taking on operatives as the opportunity arises. As between the centers where present demand has concentrated the competition for skilled men is very keen. Some of the larger companies have "runners" out, going from one place to another, advertising for men, and seeking them out in person.

The Morgan Construction Company, Worcester, Mass., has received large contracts, one of these comprising two merchant mills. It has also an order for a variety of equipment for the Carnegie Steel Company. In consequence, its shops, which have been very dull, will be busy.

The plant of the Grassadonio Tile Company, Woburn, Mass., was damaged by fire to the extent of $100,000, May 29.

The Victor Typewriter Company, New York, will erect a factory in Lawrence, Mass., to cost $400,000, according to the published announcement in that city. The company has purchased 10 acres of land on Beacon street. The building will be, in a general way, 70 x 750 ft., four stories. According to the announcement the annual capacity will be 52,000 machines. The lease of the present factory on Greenwood street, New York, expires next year.

The Graton & Knight Mfg. Company, Worcester, Mass., manufacturer of leather belting, will erect buildings to add to its storage capacity for raw materials.

The New London Ship & Engine Company, Groton, Conn., which is closely affiliated with the Fore River Ship Building Company, Quincy, Mass., has started the building of a five-story addition, 106 x 135 ft., of brick and steel. This company specializes on engines and other equipment for submarines.

The Locomobile Company of America, Bridgeport, Conn., has awarded the contract for still another new building, to be 54 x 104 ft., four stories.

The Ansonia Brass & Copper Company branch of the American Brass Company, Ansonia, Conn., will build an additional casting shop, 130 x 300 ft., of brick and steel.

The Mysto Mfg. Company, Meriden, Conn., will erect a building, 61 x 62 ft., two stories.

W. C. & C. E. Walker, Hartford, Conn., will build a factory, 52 x 200 ft., three stories, with a one-story boiler room, 25 x 30 ft.

The American Paper Goods Company, New Britain, Conn., will build a boiler house, 37 x 49 ft.

The Vermont Farm Machine Company, Bellows Falls, Vt., has started additions and improvements to its plant, in order to be able to take care of orders having to do with the war.

Baltimore

BALTIMORE, MD., May 31, 1915.

Although war orders continue to hold the attention here, the visit to this city by the Chinese Commercial Commission has emphasized the fact that plenty of opportunity is afforded for the sale of machinery and steel to China.

The Detrick & Harvey Machine Company, Baltimore, may receive a large war order similar to that secured by the Poole Engineering & Machine Company, Woodberry, Md., in the near future. This rumor has followed a conference held in Baltimore by Jacob F. Detrick, of Detrick & Harvey; J. E. Aldred, who is connected with several large industries, including the newly organized Shawinigan Electro Products Company, Highlandtown, Md.; Charles E. F. Clarke, president of the same company; and H. J. Fuller, president of the Canadian Fairbanks-Morse Company, Ltd.

A new manufacturing company is to erect a plant at Colgate Park, Colgate Station, Md. Fernsdorf & Brown, proprietors of the Baltland Distillery, Colgate Park, have purchased almost seven acres of ground and state that the work on the new buildings will start shortly. They state that the new enterprise is not to be a distillery, but they refuse to divulge the character of the industry at this time.

Gladfelter & Chambers, 729 Roland avenue, Baltimore, have secured a contract for the construction of a garage at 3503 North Charles street, Baltimore, for L. T. Appold.

Additions and alterations which will cost about $50,000 are to be made by the Terminal Freezing & Heating Company, 408 to 430 South Eutaw street, Baltimore. The plans will include the construction of a seven-story plant and the addition of two stories to the present building.

Plans to care for more work are being made by the newly organized Baltimore Dry Docks & Shipbuilding Company, Baltimore. It has selected the following officers: President, Thomas H. Bowles; vice-president and general manager, Holden A. Evans; assistant general manager, J. M. Willis; treasurer, William C. Seddon; secretary, Edwin W. Poe.

The Harlan & Hollingsworth Corporation, Wilmington, Del., will build a steel addition to its plate shop, 40 x 180 ft., at a cost of $9000.

Machinery is soon to be installed in the plant of the Wilmington Fibre Specialty Company, New Castle, Del., which it is planned to have ready July 1.

A force of men is putting into operating condition the idle plant of the Diamond State Steel Company, Wilmington, Del., owned by P. J. Driscoll, Reading, Pa. It is rumored that a company plans to take over the property for the manufacture of war materials.

The Du Pont Powder Company, Wilmington, Del., has leased a large building for the storage of materials used in the construction of shipping cases for explosives.

The J. M. Rothwell Company, Martinsburg, W. Va., has leased the Frederick City Abattoir, Frederick, Md. It plans to install cold storage plants in its abattoirs at Frederick, Staunton, Va., and Charlottesville, Va.

The ice and ice-cream plant owned by Thomas R. Green and Leslie Merrick, at Denton, Md., has been destroyed by fire.

The J. A. Bader Company, Du Pont Building, Wilmington, Del., is taking sub-bids for a four and one-half story factory, 60 x 100 ft., to cost about $35,000. The owner's name is withheld.

Indianapolis

INDIANAPOLIS, IND., May 31, 1915.

The E. Z. Starter & Drive Company, Indianapolis, has been incorporated with $5000 capital stock to manufacture automobile starters. The directors are William H. Harris, Harry S. Bynum and Orley E. Adams.

The Evansville Ways Company, Evansville, Ind., has been incorporated with $100,000 capital stock to build steamboats and barges. J. C. Greer, Thomas Williams and Charles Fuhrer are the directors.

Anderson, Ind., has sold an issue of $50,000 in bonds to pay for improvements to its electric light plant.

The Western Columbia Cabinet Company, Indianapolis, has been incorporated with $10,000 capital stock by A. L. Stout, E. W. Stout and O. F. Mehorney to manufacture furniture.

The City Council, Vernon, Ind., has granted a franchise to a private corporation for an electric light plant.

The Holmes Brass Foundry, Ft. Wayne, Ind., was seriously damaged by fire.

The Dudlo Mfg. Company, Ft. Wayne, Ind., manufacturer of enameled wire, etc., is laying foundations for a one-story addition to its factory, 54 x 80 ft. G. A. Jacobs is manager.

The Plost Post Company, Anderson, Ind., has started work on the rebuilding of its factory, destroyed by fire recently.

Ladoga, Ind., has voted in favor of a waterworks system to cost about $12,000.

Chicago

CHICAGO, ILL., May 31, 1915.

The scramble to locate and secure tools, with which to fill the orders that are flooding local machine-tool interests from abroad and from domestic manufacturers who are engaged in filling war contracts, is unabated. A feature of this activity in supplying equipment is the buying up of plants from which the machine tools are then taken. Dealers who are able to gather together almost any collection of machines seem to have little difficulty in disposing of them, so great is the pressure for immediate delivery. This territory is being scoured continuously for engine lathes, turret lathes, screw machines and milling machines. Some inquiries are in the market for a number of punch presses. The only railroad buying of interest was the purchase of equipment by the Chicago & Northwestern for its relaying rail mill, which included a Ryerson high speed friction saw.

E. J. Schnoes, 4130 North Monticello avenue, Chicago, has an inquiry out for a 3 x 5-in. air compressor with receiver, a 3-hp. alternating-current motor, a double-end grinder, with wheels 2 x 12 in., an arbor press, three vises, an upright drill, a 20 to 24-in. lathe, and a quantity of auxiliary equipment and small tools.

New garages for which building permits have been taken out in Chicago include a one-story garage, 50 x 102 ft., for A. Richman, 310 South Paulina street, to cost $8500; a one-story garage, 50 x 125 ft., for James Damsy, at 634 East 119th street, to cost $10,000; and a one-story garage, 143 x 200 ft., for A. Fuchs at 826 Grace street, to cost $40,000.

Sears, Roebuck & Co., Chicago, has acquired the property of the Domestic Sewing Machine Company, at Kankakee, Ill., and will equip it for the manufacture of oil stoves. It will install new machinery as the former equipment of the plant has been purchased by Harris Brothers, Chicago.

The Swanstrom Pneumatic Pump Company, Chicago, has been organized with a capital of $2500 by James T. Fales, F. P. Arnfield and Maurice Kozyne. It can be addressed in care of James T. Fales, 69 West Washington street, Chicago.

The Kewanee Broom Company, Kewanee, Ill., has acquired new quarters and will install equipment.

The Cabirange Mfg. Company, Belleville, Ill., has been incorporated with a capital stock of $10,000 by G. D. Klemme, George A. Kloess and Julius J. Kohl, Jr., to manufacture ranges, stoves, etc.

The Peoria Coal Drill Works, Peoria, Ill., has been organized for the manufacture of coal mining equipment by R. H. Herschel, Sr., Joseph A. Weil and Diedrich Janssen, with a capital of $10,000.

The foundry and machine shop conducted by Preston & Wade, Canton, Ill., while not in the market at the present time, contemplates the installation of foundry equipment for the manufacture of brass castings. The company now specializes in municipal work and castings for mine cars and wheels.

The Wrot Iron Heater Company, Des Moines, Iowa, has moved into its plant, recently completed at a cost of about $25,000. It has installed the latest type of machine tools; but will purchase a complete line of foundry equipment within the next few days. D. B. Howard is general manager.

A representative of French interests is negotiating with the Enamel Concrete Company, Des Moines, Iowa, for nine brick-making machines of 40,000 pressed bricks a day capacity each, to cost in all about $450,000. It is proposed to ship these machines to Europe as soon as possible and set them up near Paris so as to get the manufacture of brick on a large scale under way in anticipation of rebuilding when the war is over.

The Ft. Madison Button Company, Ft. Madison, Iowa, has let contract for the erection of a new factory.

Karl E. Kling, Duluth, Minn., plans to incorporate a company with a capital stock of $100,000, to be increased later to $250,000, under the style of the Great Western Auto Company. It will erect an automobile rebuilding and repair plant, 100 x 140 ft., of brick and steel construction. The latest type of machinery and tools for these uses will be installed.

Cleveland

CLEVELAND, OHIO, May 31, 1915.

The demand for machinery for making war material, particularly for lathes, continues active, although there are no inquiries for round lots of machines, which was a feature of the market a few weeks ago. Sales last week included a number of machines to Canadian shops having war orders. The automobile makers are also buying considerable machine tool equipment. Outside of these two fields not a great deal of activity is reported. New inquiry, however, has come out for some heavy machines that are not to be used for war purposes. The Morgan Engineering Company, Alliance, which had an inquiry out for 16 heavy-duty lathes, has purchased its additional equipment from a local machinery agency. The William Tod Company, Youngstown, which is reported to have taken an order for making 4½-in. shrapnel shells for the United States Government, is in the market for a number of 16 to 24-in. lathes. Conditions in the foundry trade continue good. Foundries making automobile parts and machinery castings are very busy.

The American Fire Clay & Products Company, Cleveland, has been incorporated with a capital stock of $1,000,000 by Max P. Goodman, and others, to operate brick, tile and glass plants in Ohio. It is stated that the company has options on some plants now in operation and plans to build others.

It is reported that the National Mine Machinery Company has acquired a factory building in Orrville, Ohio, in which it will locate a plant.

The National Handle Company, Findlay, Ohio, will erect a one-story plant to replace that burned a few weeks ago. New machinery will be installed.

The plant of the Automatic Machine & Tool Company, Toledo, Ohio, has been taken over by the Dime Savings Bank, of that city, to satisfy a mortgage.

The B. F. Goodrich Company, Akron, Ohio, is having plans prepared for a large factory building, contracts for which will be placed shortly.

Detroit

DETROIT, MICH., May 31, 1915.

The volume of business transacted in Detroit territory in May was very satisfactory, and showed a considerable increase over the previous month. The market has been fairly active the past week, with a good demand both for standard metal-working tools and special equipment. Second-hand machinery continues to be a feature in this market. Inquiry is steady and there is every reason to believe that present activity will continue for some time. General industrial conditions are very good, the manufacturers of machinery and tools have a good volume of orders on their books and indications point to an active summer. The improvement in building conditions noted last week is still apparent, and contractors are increasing their payrolls.

Frederick E. Wadsworth, manufacturer, Detroit, has acquired a factory site, 300 x 1200 ft., in the Fairview factory district, and, it is reported, will establish there an automobile body plant. The size of the proposed plant is 240 x 260 ft., four stories. Mr. Wadsworth is connected with the Michigan Steel Boat Company, the Detroit Engine Works and other companies.

The Detroit Screw Works, Detroit, has completed plans for the erection of an addition to its plant to cost $25,000. The new building will be 80 x 200 ft., five and six stories. The company reports an excellent volume of orders, and states that the addition is made necessary to take care of its rapidly increasing business.

The Federal Motor Truck Company, Detroit, has increased its capital stock from $200,000 to $500,000.

The R. & W. Auto Accessory Company, Detroit, has been incorporated with $20,000 capital stock to manufacture a line of automobile accessories. Robert T. Williams and Ray C. Cowan are the principal stockholders.

The Detroit Bronze Castings Company, Detroit, has been incorporated with $2000 capital stock to operate a brass foundry. Albert F. Mochrie and Kenneth K. Hall are among the organizers.

The Sharpe Aero Motor Company, Detroit, has been incorporated with $50,000 capital by Henry E. and Oscar A. Peters and William A. Sharpe, to manufacture motor accessories.

The Bay City Cast Stone Block Company, Bay City, Mich., has completed plans for a one-story addition to its plant, 30 x 116 ft. Additional equipment will be installed.

The Vanderbilt Mfg. Company, Vanderbilt, Mich., chair manufacturer, is contemplating the erection of a larger plant.

The Michigan Wood Preserving Company, Reed City, Mich., will add a blockmill and a sawmill to its plant, and will install additional equipment.

Woods & Benoit, Mishawaka, Ind., will establish a pearl button plant at St. Joseph, Mich.

The Independent Motors Company, Port Huron, Mich., has increased its capital stock from $60,000 to $120,000.

The National Spring & Wire Company, Albion, Mich., will erect an additional factory building. The plans call for a structure 48 x 100 ft.

The Automobile League of America, Detroit, has acquired a factory at Wayne, Mich., and will install equipment for the manufacture of automobile tires.

The Wilcox-McKim Company, Saginaw, Mich., has filed a voluntary petition in bankruptcy. The company is a large manufacturer of automobile parts and marine engines. It is stated that steps will be taken to reorganize the concern.

The Superior Mfg. Company, Ann Arbor, Mich., manufacturer of automobile lamps and windshields, has increased its capital stock from $100,000 to $200,000.

The Spee Company, Saginaw, Mich., is the name of a new company incorporated with $5000 capital stock to manufacture boilers and engines.

Milwaukee

MILWAUKEE, WIS., May 31, 1915.

Manufacturers who attended a committee meeting of the Milwaukee Metal Trades and Founders' Association, held last Thursday, seemed to be taking a more optimistic view of the trade situation and practically all of them reported that the metal trade is permeated with a much brighter aspect. While many of the large plants are still operating on war orders there appears to be a sentiment that general domestic business is showing improvement. Automobile makers are placing some good orders for tools and the demand from the railroads is a little more active. The local building situation is showing steady improvement.

The Wisconsin-Minnesota Light & Power Company, with headquarters at La Crosse, Wis., is making preparations to spend $48,000 in reconstructing its heating system distribution lines.

The Wabeno Lighting Company, Wabeno, Wis., has been incorporated with a capital stock of $5000 by G. W. Jones, H. C. Humphrey and R. H. Jones.

The Winnebago County Auto Company, Oshkosh, Wis., is erecting a new garage of fireproof construction, 60 x 100 ft.

The West Bend Plating Company, West Bend, Wis., is installing four new vats, of 100 gal. capacity each, and will now be able to handle a larger class of work.

The Dornfeldt-Kunert Iron Works, Watertown, Wis., has been purchased by J. F. Dornfeldt, who is now conducting the business as sole owner.

Kenosha, Wis., will build a new high school, costing $100,000 and containing a complete manual training department. Plans are now being prepared by H. H. Hahn, architect, Kenosha.

The Hamilton-Beach Mfg. Company, Racine, Wis., electrical devices and appliances, will erect an addition, 50 x 250 ft., three stories. It will be of brick and mill construction.

The United States Glue Company, Carrollville, Wis., will make two important additions this year, one a manufacturing building, one story, 154 x 365 ft., and the other a warehouse, two stories, 205 x 225 ft.

Cincinnati

CINCINNATI, OHIO, May 31, 1915.

The export order for 200 electric bench grinders, mentioned last week, is still hanging fire. Makers of electric drilling and grinding machines also report an increase in the number of domestic inquiries and orders. Machine tool builders note an improvement in domestic business; but most of the inquiries are from companies making war munitions. Some business, however, has been received lately from auto-truck manufacturers. Deliveries on lathes especially are somewhat uncertain so far as several sizes are concerned,

and machine-tool dealers are making urgent requests of their prospective customers to place orders as far ahead as possible. Skilled labor is scarcer, and manufacturers would welcome recruits from other centers where plants are not as busy.

Agents for manufacturers of high-speed steels and machinists' supplies report the month of May as being the most satisfactory one of the present year, with sales far ahead of the corresponding month of 1914. As far as is known no additional orders for shrapnel were taken last week by nearby manufacturers, but it is understood that more business of this character is pending.

The Cincinnati Foundry Company, Winton place, Cincinnati, is adding to its equipment; but it is understood that all purchases have been made.

The Cincinnati Pulley Machinery Company, Covington, Ky., suffered an estimated fire loss of $1000 on May 27. The fire will cause no delays in shipments.

The Cincinnati Iron & Steel Company, Cincinnati, will soon let contract for an addition to its plant, 30 x 120 ft., one story, of steel construction, to be used for storage purposes.

The Kuntz-Johnson Lumber Company, Dayton, Ohio, whose plant was recently destroyed by fire, has made arrangements for rebuilding.

The Electro Chemical Company, Dayton, Ohio, has been incorporated with $200,000 capital stock by Elmer E. Niswonger, and others, and has taken over the business of the National Machinery Company, Dayton. It will manufacture special laundry machinery.

The Lindner Brothers' Sanitary Milk Company, Dayton, Ohio, has increased its capital stock from $15,000 to $35,000 and will install additional refrigerating equipment.

The Dayton Electric Laboratories Company, Dayton, Ohio, has acquired a site adjoining its plant, and it is reported that further additions are planned.

The Kelley-Springfield Motor Truck Company, Springfield, Ohio, has recently received a large order for motor trucks that has necessitated running its plant on an overtime basis. It is not known as to whether any new equipment will be installed in the company's plant.

A. Lockwood, Dayton, Ohio, is one of the new owners of the Troy Foundry Company, Troy, Ohio, whose plans were recently mentioned. The old foundry building will be razed and a new plant erected.

C. C. Outland, mayor of Zanesville, Ohio, is interested in a new company organized to erect an electric lighting plant in that city.

The Brown Accessory Mfg. Company, Wilmington, Ohio, has been incorporated with $12,000 capital stock to manufacture auto accessories. Roy M. Brown is one of the principal incorporators.

Marietta, Ohio, is considering the erection of a light and power plant. No plans have yet been made.

The Standard Marble Works Company, Cincinnati, has let contract for an addition to its plant on West Front street to cost approximately $40,000. Nothing is known as to equipment requirements at this time.

The Webster & Perks Tool Company, Springfield, Ohio, has leased space in the Shuey factory building for additional quarters. About 21,000 sq. ft. of floor space is covered by the lease. The company is in the market for lathes, shapers, milling machines, radial and plain drill presses, planing machines, electric motors, and miscellaneous equipment, such as steel lockers, bins, etc.

The Central South

LOUISVILLE, KY., June 1, 1915.

Although the number of new manufacturing plants being started seems to be larger than heretofore, reports from machinery houses are that business is still fairly quiet. Manufacturers of machine tools are getting more trade than others, the demand from England being particularly good just now. A manufacturer of dynamos reported having had an inquiry from a gasoline engine manufacturing company, which is figuring on the delivery of a number of portable lighting plants for use in the war zone. The generators are to be 15 kw. Boiler business is looking up, a number of good prospects having developed recently, and tank work is also helping out plants of this kind. Wood-working machinery continues to improve.

The Holly Ridge Lumber Company, Louisville, which operates a sawmill at Holly Ridge, La., is considering the installation of planing-mill equipment. E. B. Norman, Holly Ridge, is in charge.

Butler & Romano, Third and Broadway, Louisville, will purchase a used foot-power lathe for their repair shop.

The Essenja Company, 517 South Preston street, Louisville, will specialize in building concrete foundations for engines and boilers.

T. W. Minton & Son, Barbourville, Ky., will double the capacity of their wood-working plant, which turns out vehicle woodstock and golf sticks.

E. T. Rogers, Greensboro, Ky., is purchasing equipment for an ice-cream factory.

The Tompkinsville Electric Light & Ice Company, Tompkinsville, Ky., has been incorporated with $10,000 capital stock. It will build an ice factory and enlarge its electric plant.

Cincinnati interests are reported to be figuring on a $250,000 electric power plant for Harlan, Ky. The Harlan Commercial Club can give further details.

The Dix River Power Company, Richmond, Ky., which was organized over a year ago to build a hydroelectric power plant in Central Kentucky, is reported to have taken up the project again.

Lieut.-Col. H. Jervey, United States Engineers Corps, Cincinnati, will receive bids until June 15 for building a powerhouse at Dam 29 on the Ohio River, near Ashland, Ky.

The Ashland Electric Light & Power Company, Ashland, Ky., has increased its capitalization from $25,000 to $32,000.

The Tennessee Producers Marble Company, Knoxville, Tenn., has let a contract for the erection of a steel and concrete marble mill to cost $75,000. It will purchase marble-working machinery. J. M. Dunn & Son, Knoxville, are the contractors.

The Crawford-Williamson Construction Company, Memphis, Tenn., has a contract for the erection of a cotton compress to be equipped with engine, boiler, etc.

The Success Automatic Gate Company, Tullahoma, Tenn., will equip a plant for the manufacture of farm gates. It is now in the market for wood-working equipment, and also for materials for manufacturing, including malleable iron castings, etc.

The G. W. Simmons Company, 89 South Front street, Memphis, Tenn., is in the market for a die machine and a hamper basket machine, preferably second-hand.

The Chisca Mfg. Company, Memphis, Tenn., is being organized by the Business Men's Club with $500,000 capital stock for the purpose of establishing a cotton mill. F. N. Fisher is president of the club.

The Crystal Ice Company, Knoxville, Tenn., has been organized with $40,000 capital stock and will establish a factory. H. W. and J. H. Lynn, H. A. Harth, and others, are stockholders.

The Nashville, Chattanooga & St. Louis Railroad, with general offices in Nashville, Tenn., has completed the construction of a steel coal-handling plant at Hollow Rock Junction, Tenn., and is planning the construction of similar plants at other points on its lines.

The Columbia Ice & Cold Storage Company, Columbia, Tenn., has been organized with $100,000 capital stock by Henry O. Fulton and Franklin D. Chaffin, Columbia; J. Frank and W. J. Rushton, Birmingham. It will equip an ice factory with a capacity of 50 tons a day, including a large cold storage department.

Bristol, Tenn., has been authorized to issue $100,000 of bonds for building an electric light plant.

A two-story brick machine shop is being constructed at 648 Marshall avenue, Memphis, Tenn., for F. H. Heiskell, at a cost of about $10,000. It will be leased and occupied by the American Piston Ring Company.

The International Ditching & Road Machinery Company, Owensboro, Ky., has been incorporated with a capital stock of $50,000 by W. R. Williams, C. A. Rogers and James C. Bunch.

Birmingham

BIRMINGHAM, ALA., May 31, 1915.

The demand for sawmill apparatus is general in Alabama and adjoining states. The building of many small factories is beginning to establish a call for machine tools. Quite a lot of business is being done in second-hand machinery for repair shops. Gasoline engines are in steady demand by the rural trade. Business in general still lags as compared with the same period last year, but a slight improvement is noted weekly. Collections are fair to good.

The Birmingham Stove & Range Company, Birmingham, has decided to rebuild its plant in this city, recently burned.

The Kilby Locomotive & Machine Works, Anniston, Ala., is building a malleable iron foundry of 10 tons a day capacity. It will be of brick, 60 x 240 ft. The company is in the market

for a malleable iron furnace and other foundry equipment. W. Clark is vice-president.

The Hurtsboro Machine Shop, Hurtsboro, Ala., of which E. Renfro is president, will go into the manufacture of wagons, buggies and furniture.

Dadeville, Ala., has voted $16,000 for the establishment of a waterworks system.

Northport, Ala., will construct a waterworks system on the proceeds of $15,000 worth of bonds, recently voted. Edgar B. Kay, Tuscaloosa, is the engineer.

J. B. Collins, Carrollton, Ala., proposes to establish a planing mill.

The United States Cotton & Lumber Company, Fairford, Ala., contemplates the establishment of three sawmills.

The Bolinger Lumber Company, Millry, Ala., contemplates the building of two sawmills.

The Florida Woodenware Company, Palatka, Fla., will rebuild its plant, recently burned at a loss of about $50,000. It has placed orders for the machinery.

North Alabama Warehouse & Compress Company, Gadsden, Ala., will operate cotton compress and warehouses.

The America Mica Company, Atlanta, Ga., has been incorporated with a capital stock of $10,000 by G. N. Randolph, R. S. Barber, and others.

Greeneville, Fla., will install an electric lighting plant, a waterworks and a sewerage system.

The Tennessee Valley Motor Company, Huntsville, Ala., is in the market for machine tools and other equipment for an automobile repair shop.

William H. Platts, Thomasville, Ga., plans the establishment of a brick plant.

Plant City, Fla., will receive bids until June 5 for waterworks equipment. E. W. Mays is superintendent.

The Jackson River Lumber Company, Apalachicola, Fla., is establishing a plant for the manufacture of boxboards from cottonwood.

The British-American Company is considering the establishment of a shipbuilding plant at Tampa, Fla. The Seaboard Air Line, through Vice-President C. R. Capps, Norfolk, Va., offered the company a site.

The Bladen Mfg. Company, Bladenboro, N. C., has been incorporated with a capital stock of $50,000 by H. C. and R. L. Bridger, and others, who plan to erect a cotton seed oil mill to cost about $40,000.

Texas

AUSTIN, TEX., May 29, 1915.

An increased demand for irrigation pumping machinery is the feature this week. The sales of oil well drilling machinery and equipment fell off. Business conditions generally are good. Most of the oat crop is already harvested. The yield will be a record-breaker in size. The wheat harvest is now in progress. The cotton crop is in fine condition.

The following irrigation pumping plants will be installed at various points in Texas: C. C. Kountz & Son, on Kountz Draw, near Pecos; Samuel Taylor, on Nueces River, near Leakey; Adams Brothers, on North Llano River, near Sonora; J. W. Blakeslee, on Kountz Draw, near Pecos; C. A. Eggleston, on Barilla Draw, near Pecos; H. T. Odneal, on Coyanosa Creek, near Pecos; J. M. Graham, on Pinto Creek, near Del Rio.

The constructing quartermaster, United States Army, Fort Sam Houston, will receive bids June 11 for constructing a pumping plant, pumphouse, etc.

Isadore Newman & Sons, New Orleans, have purchased a controlling interest in the McKinney Ice, Light & Coal Company, McKinney. The plants will be enlarged.

The Southern Farmers' Silo Company, Houston, has been organized with a capital stock of $14,000. D. A. Weis is a stockholder.

The Northwestern Compress Company, Ft. Worth, has increased its capital stock from $80,000 to $300,000 for the purpose of enlarging and improving its cotton compress.

S. S. Osborn, Chanute, Kan., and associates, plan to build at Thrall an oil refinery of about 1000 bbl. capacity per day.

The Nelson Morris Packing Company, Chicago, has purchased a site at Dallas for a branch distributing plant.

E. S. Gooch and associates are interested in the construction of an irrigation system near Lawton, Okla., to cost about $100,000.

The Butt Joint Nestable Culvert Company, Dallas, has been organized with a capital stock of $75,000. A. W. Nelson is among the incorporators.

The Kingsville Auto & Electric Company, Kingsville, will build a garage and repair shop. C. H. Flato is in charge.

The People's Oil & Cotton Company, Wharton, has been organized with a capital stock of $50,000 to manufacture cotton-seed oil.

The Cherokee County Oil Company, Jacksonville, has been organized with a capital stock of $10,000 to manufacture cotton-seed oil. O. L. Miller is among the stockholders.

The Ammons Automatic Fire Alarm System of Texas, Houston, has been organized with a capital stock of $100,000. J. B. Ammons is an incorporator.

An icing plant of 250 carloads daily capacity is being built at Deming, N. M., jointly by the Southern Pacific and the Atchison, Topeka & Santa Fé Railroads.

Charles T. Nagle, El Paso, and associates, plan to build a 30-ton ice plant.

It is reliably reported that all the locomotives on the Ft. Worth & Denver City Railroad are to be equipped with oil burners and that the use of coal fuel will soon be discarded. Sites are being selected for a number of large oil storage tanks to be erected at different points on the line.

The Pierce Oil Corporation plans to build an oil pipe line from the Oklahoma oil fields to Ft. Worth. It is stated that H. Clay Pierce, president of the company, has contracted for a supply of oil to be handled by the proposed pipe line.

St. Louis

ST. LOUIS, MO., May 31, 1915.

Aside from slight difficulty in getting some types of machine tools, usually of the kinds required for the manufacture of war munitions, the machine tools business shows no change from recent reports. Inquiry is light and without encouraging developments. Dealers are not enthusiastic over immediate and early delivery business. Reports from the agricultural territory tributary to St. Louis continue encouraging. Money is still easy in banking circles, with the usual caution manifest as to permanent investment. Collections are better than for a long time.

The Steinmeyer Washing Machine Company, St. Louis, Mo., has been incorporated with a capital stock of $14,000 by August Steinmeyer, Edward C. Bergt and Oscar Harsch.

The Birge-Brown Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of $10,000 by Arthur B. Birge, Anderson, Ind.; Walter B. Brown and Ernest N. Birge, St. Louis, to manufacture wood products.

A generator of the Union Electric Light & Power Company, St. Louis, Mo., was destroyed by fire with a loss of $6000.

The Valier & Spies Milling Company, St. Louis, Mo., will erect an elevator at 2511 East Marcus avenue, St. Louis, to cost about $150,000.

The Philip A. Rohan Boat, Boiler & Tank Company, St. Louis, Mo., has been incorporated with a capital stock of $25,000 by Philip A. and S. H. Rohan and W. F. Fahey.

The Stearns-Knight Auto Company, St. Louis, Mo., has been incorporated with a capital stock of $10,000 by D. D. Brownback, T. A. Conrad, I. F. Brownback and E. H. Conrad.

The plant of the Christian F. Pestel Cooperage Company, St. Louis, Mo., which has been burned with a loss of $20,000, is to be replaced.

The Holekamp Lumber Company, St. Louis, Mo., which recently increased its capital stock from $40,000 to $75,000, will increase its planing mill equipment.

The St. Louis Basket & Box Company, St. Louis, Mo., will erect a factory, office and warehouse building and will install additional machinery.

Chilhowee, Mo., has voted $6800 for equipping the generating plant of its electric light station.

St. Joseph's Hospital, Kansas City, Mo., will install a 30-ton ice-making and refrigerating plant, also an engine and generators for power and electric lighting, etc. Henrici, Kent & Lowry, Kansas City, are the consulting engineers.

Kirksville, Mo., will expend $70,000 equipping an electric light plant and rebuilding its waterworks plant.

Liberty, Mo., will equip an electric light and power plant, expending about $55,000. The mayor should be addressed.

The Southern Illinois Light & Power Company, Hillsboro, Ill., will equip for supplying electric light and power to the city of Troy, Mo.

The Producers' Refinery Company, Kansas City, Mo., has been incorporated with a capital stock of $600,000 by L. A. Oliver, F. M. Thwing and H. M. Evans, and will equip an oil refinery.

The Atchison, Topeka & Santa Fe Railway will increase the capacity of its elevator in Kansas City, Mo., by 2,000,000 bu. C. F. W. Felt, chief engineer, Chicago, is in charge.

The Kansas City Auto Parts Company, 1827 McGee street, Kansas City, Mo., incorporated with a capital stock of $100,000, will manufacture auto parts.

The Big Niangua Hydro-Electric Company, Ridge Building, Kansas City, Mo., has plans for the equipment of a plant to cost $2,500,000 and develop 30,000 hp. Thomas S. Ridge is general manager.

Rockport, Mo., will equip waterworks to cost about $13,000 for the power and pumping machinery. Bids will be received until June 10. W. B. Rollins & Co., Kansas City, are the engineers in charge.

Rieff & Co., Little Rock, Ark., will rebuild its planing mill recently burned with a loss of $5000.

A sanitary sewer system is to be equipped at Siloam Springs, Ark., at a cost of about $40,000. Winters & Dove, Ft. Smith, Ark., are the engineers.

The E. T. Peck Cooperage Company, Bentonville, Ark., will install equipment for the manufacture of barrels.

The cotton compress at Camden, Ark., owned by M. A. Joy, Terrell, Tex., which has been burned with a loss of $30,000, will be replaced.

The Rosboro Lumber Company's electric power plant at Rosboro, Ark., which has been burned with a loss of $15,000, will be replaced.

The Cedric Threshing Machine Company, Randlett, Okla., has been incorporated with a capital stock of $12,400 by J. W. Parker, S. J. Fender and J. W. Elmore.

Mannsville, Okla., will expend $5500 on an electric generating plant.

The United Producing & Refining Company, Tulsa, Okla., has been incorporated with a capital stock of $300,000 by James E. Dunn, Tulsa, Okla.; R. F. and R. C. McMillen, Kansas City, Mo.

The Bounds Aeroplane Company, Madill, Okla., has been incorporated with a capital stock of $13,500 by Overton Bounds, J. E. McMillan and E. H. Baldwin and will equip to manufacture aeroplane motors, etc.

Eaton & Dunn will equip a waterworks plant at Oilton, Okla., P. O. at Jennings. Machinery is wanted to supply a population of about 5000, including boilers, engines and pumps.

A waterworks plant is to be equipped at Boswell, Okla., to cost about $16,000. J. T. George is city engineer.

The port commissioners, New Orleans, La., of which Ernest M. Loeb is president, will receive bids until June 9 for boilers and other power equipment for the new cotton warehouses and terminal. Cranes, both traveling and transfer, are also wanted.

The sewerage and water board, New Orleans, La., of which F. S. Shields is secretary, is in the market for a traveling crane of about 15 tons capacity.

The dock board, New Orleans, La., has decided to equip a grain elevator to cost about $1,250,000. Ford, Bacon & Davis, New Orleans, La., are engineers.

The Zigler Dredgeboat Company, Jennings, La., has the contract for about 25 miles of canal for the drainage commissioners at Estherwood, La. Ellis Hoffpauir is president.

Whitecastle, La., will install an electric light and power plant and waterworks, the machinery to cost about $25,000. X. A. Kramer, Magnolia, Miss., is the engineer.

Hammond, La., has completed its plans for its sewage disposal plant to cost about $50,000. X. A. Kramer, Magnolia, Miss., is the engineer.

The Pacific Northwest

SEATTLE, WASH., May 25, 1915.

The machine-tool trade shows no activity except in a small way; but the general machinery business continues gradually to improve. A continued revival of mining and smelting operations in eastern Oregon and Washington, and in Idaho and Montana, gives rise to an active demand for power equipment, hoists, compressors, etc.; and an active development throughout that region in small electric power plants is going on, as well as the adaptation of mills and mines to electric power. Implements and farm machinery are in strong demand. The Alaskan trade is opening up in good shape. Business in all lines is seriously hampered by lack of export shipping facilities. A large quantity of machinery is being shipped to the Orient; but the domestic demand would be much greater if vessels could be had to export lumber, grain, etc.

Chas. R. McCormick & Co., controlling lumber mills in the vicinity of Portland, announce that they will shortly let a contract on the Atlantic Coast for the construction of a steamer of 5,000,000 ft. of lumber capacity, for trade through the Panama Canal.

The Trestle Creek Power Company, Spokane, Wash., is preparing to build a 600-hp. hydroelectric plant and concentrator near Sandpoint, Idaho. Ralph Reinertson is in charge.

The New Western Auto Supply Mfg. Company, Bellingham, Wash., plans the construction of an addition to its plant. H. Arthur Conkin is general manager.

The Castle Rock Briquet Company, Kelso, Wash., recently organized, has made definite arrangements for the construction of a coal-briquetting plant at its mines near Castle Rock. A. L. King is president.

The Wood-Ewing Iron Works, Portland, Oregon, has been incorporated by R. B. Wood and L. H. Ewing, of that city, who until recently were identified with the John Wood Iron Works. The new concern has taken over all the machinery and interest of the North Star Iron Works, Portland.

The Air Cooler Burner Company, Chehalis, Wash., has been incorporated by W. F. Crown, C. A. Doty and J. T. Stoddard, and the company has a capital stock of $100,000. It plans to establish a plant, but for the present will only assemble its product.

The United States Hydraulic Ram & Irrigation Company, Tacoma, Wash., has been organized with a capital stock of $100,000, to manufacture a hydraulic ram. The trustees are Harry H. Johnston, J. G. Lampson and J. E. Lester, all of Tacoma.

The plant of the Brown & Kunze Shingle Company, Arlington, Wash., was destroyed by fire recently, with a loss of about $24,000. It was a six-machine plant. The company had just completed installation of new saws and other equipment. The plant will be rebuilt immediately, probably with a capacity of four machines.

The American Wood Products Company, Spokane, organized about one year ago, announces that construction will start on a plant for the manufacture of automobiles using steam turbine power. It will make an initial expenditure of about $20,000. H. B. Spear and J. H. McCoy are at the head of the company.

Contract for a 3-story and basement addition to the plant of the Stettler Box Company, Portland, Ore., has been awarded to Litherland & Abrey, Beck Building, Portland. The building will be 100 x 200 ft., of reinforced concrete and mill construction, and will cost about $45,000.

R. D. Berghardt, Friday Harbor, Wash., has been granted an electric light and power franchise by the City Council, and an electric power plant will be erected within six months.

Notice of appropriation of waters of Twin Lakes, near Everett, Wash., for light, power and manufacturing purposes has been filed by the Jim Creek Water, Light & Power Company, Arlington.

The Niagara Ladder Company, Hoquiam, Wash., has been incorporated for $12,000 by J. J. Macklem and A. S. Macklem, of that city. It plans the construction of a small plant for the manufacture of a patented ladder device.

The Grand Ronde Lumber Company, Perry, Ore., has increased its capital stock from $650,000 to $1,000,000. The additional funds will be used in making extensions and improvements to its plant. C. W. Nibley is president.

The Guelph Mining Company, Kellogg, Idaho, will equip its properties with an electric power plant, compressor, pumps, hoist, etc.

The Port of Portland, Ore., will ask for bids for the installation of a 20-ton locomotive crane.

The elevator of the Ellison Milling Company, Lethbridge, Mont., will be rebuilt this summer. The new elevator will have a capacity of 40,000 bu.

Western Canada

WINNIPEG, MAN., May 29, 1915.

Hardly any change has occurred in the situation as far as demand for machinery is concerned. Business is only fair. The industrial progress of Western Canada as a whole is slower than in previous corresponding seasons. Demand for machinery parts for repair work and additions to plants continues steady. The financial situation shows very little improvement, and confidence in the outlook is stimulated by the bright crop prospects.

The Dominion Government has let the contract for a 1,250,000-bu. elevator at Vancouver, B. C., to The Barnet & McQueen Company, Ft. William, Ont. It will cost about $700,000.

The Bull Tractor Company of Canada, Ltd., has been organized at Port Arthur, Ont., to manufacture bull tractors.

The Brackman-Ker Company, Ltd., New Westminster, B. C., is preparing to build a grain elevator there. Tenders will be called soon.

The Western Terminal Elevator Company, Ltd., Ft. William, Ont., will start right away to build a mixing elevator, at a cost of about $100,000.

Eastern Canada

TORONTO, ONT., May 31, 1915.

The value of the iron ore produced in Ontario during the first three months of the year increased $37,664 compared with the corresponding period last year. The production of pig iron, on the other hand, decreased 50 per cent.

The Dominion Wheel & Foundry Company, Toronto, is to extend its factory on Eastern avenue at a cost of $7500 for the manufacture of high explosives.

The plant of the North American Smelting Company, Kingston, Ont., has been secured by local capitalists and will be used for the manufacture of shells.

An item in *The Iron Age* of May 20 reporting the equipment of a factory for the Canadian Stamping Company, Ltd., Walkerville, Ont., was incorrect. The name of the company should have been given as the Dominion Stamping Company, Ltd. B. W. Vallat is president; and W. C. Oddy, purchasing agent.

The Spartan Machine Company, Ltd., Montreal, has been incorporated with a capital of $50,000 to manufacture machinery, tools, railway cars and builders' supplies. Erastus E. Howard, Jacob De Witt and Henry C. McNeil, all of Montreal, are the incorporators.

Hespeler, Ont., is in the market for pumping machinery, etc. Bowman & Connor, civil engineers, Berlin, Ont., are in charge.

Ker & Goodwin, Brantford, Ont., are erecting an addition to their machine shop to cost $4000.

The Ford Motor Company, Windsor, Ont., is to establish an assembling plant at Vancouver. Gordon M. McGregor, Windsor, Ont., is general manager.

Concrete blocks, bricks and pipes will be manufactured by the Ontario Concrete Building and Construction Company, Ltd., recently incorporated with a capital stock of $40,000. The directors are Patrick O'Donnell, Hugh J. McNinley and George E. Buchanan.

The Bowmanville Gravel Company, Ltd., Bowmanville, Ont., has been incorporated with capital stock of $40,000 to operate quarries. John T. Marsh, Bowmanville, is one of the stockholders.

Ætna Chemical Company, Ltd., Montreal, has been incorporated with a capital stock of $1,800,000 to manufacture explosives. The incorporators are Orick B. MacCallum, James L. Finlay, George F. Gyles, Burton F. Bowler and William E. Brown, all of that city.

A toy factory is to be started in Toronto by Charles Churcher, Norman Churcher and Charles John Churcher under the style of the Canadian Toy & Novelty Company, Ltd., with capital stock of $40,000.

Burlington, Ont., is calling for tenders, due June 15, for a sewage disposal works and pumping station. James C. Allen is town clerk.

John A. Donovan, James Aitchison, George H. Sedgewick and Archibald T. Struthers have incorporated the Ontario Wind Engine & Pump Company, Ltd. The capital stock is $100,000 and the head office is in Toronto.

The Tupper Fire Escape Company, Ltd., Sherbrooke, Que., has been incorporated with a capital stock of $100,000 to manufacture fire escapes and safety devices. The incorporators are William Tupper and Carlos A. Stokes, Bury, Que.; George Layfield, Montreal; James C. Nowell, Louis Landry and Frank E. Woodbury, all of Franklin, N. H.

Stratford, Ont., has passed a by-law to borrow $50,000 for a gasoline pumping plant and water tower.

Goderich, Ont., has passed a bylaw to aid the North American Chemical Company, Ltd., to extend its salt plant in that town.

Harold J. Petrie, Thomas H. Crerar, Leroy E. Awrey, William A. Stewart and Frederick W. Barton, all of Hamilton, have been incorporated the Burlington Rapid Transit & Motor Mfg. Company, Ltd., to manufacture automobiles, motor trucks, etc. The capital stock is $50,000.

Government Purchases

WASHINGTON, D. C., May 31, 1915.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until June 15, schedule 8385, for 14 spur-geared chain hoists for Washington, D. C.; schedule 8366 for two 200 kw. turbo-generating sets for Philadelphia; schedule 8377 for one induction motor for Washington and 10 shunt-wound direct-current motors for Newport; schedule 8360, one single-acting plunger pump for Washington; schedule 8361 for two vertical turret lathes for Newport; schedule 8364 for two jib lifting hydraulic cranes for Norfolk; schedule 8365 for one three-screw type testing machine, and schedule 8378 for one centrifugal pump, both for Annapolis.

Electric Steel in Germany and Austria in 1914

The production of electric steel in Germany in 1914 was 89,336 metric tons. According to data furnished by Siemens & Halske, 44,080 tons, or 49.34 per cent. of this was made in the following types of furnaces which that firm controls:

	Tons	Per cent.
Induction furnaces	34,393	38.50
Girod furnaces	7,437	8.32
Radiation furnaces	2,250	2.52

Twenty electric steel plants were producing steel in Germany in 1914 as follows: Plants with only induction furnaces, 6; induction and Girod furnaces, 2; Girod furnace only, 1; radiation furnace, 1; Heroult furnaces, 7; Nathusius furnaces, 2; Keller furnace, 1. Of these 8 use the electric furnace for making high-grade electric steel to supplant crucible steel, distributed as follows: Plants using only induction furnaces, 4; using induction and Girod furnaces, 2; using Heroult furnaces, 2.

Germany's crucible steel output in 1914 was 95,096 metric tons, which with the electric steel output makes 184,432 tons, of which 51.6 per cent. was crucible steel. In 1914 there were 12 plants in Germany using electric furnaces to melt ferromanganese as follows: Induction, 4; Rombach, 1; Girod, 1; Heroult, 3; Nathusius, 1; Keller, 2.

Austria-Hungary's production of electric steel in 1914 was 19,844 metric tons, of which 9037 tons or 45.54 per cent. was made in induction furnaces. The crucible steel output was 17,557 tons or 46.9 per cent. of the total of crucible and electric steel, 37,401 tons.

For the purpose of indicating business opportunities in Europe to American manufacturers the Department of Commerce has issued a monograph entitled "Some Aspects of the Iron and Steel Industry in Europe" which may be obtained for a nominal price from the Superintendent of Documents, Washington, D. C. This publication covers France, Germany, Italy, Sweden, Switzerland and the United Kingdom, and contains facts concerning places of manufacture, character of products, the best foreign markets, distances to the most advantageous ports, railroad freight rates on the various commodities, cost of handling at ports and labor conditions.

The Special Libraries Association will hold its annual meeting at Berkeley, Cal., June 7 and 8, at which a series of papers covering matters of interest to special librarians will be presented. Guy E. Marion, who has been secretary since March, 1910, has resigned. During his term of office the membership of the association has grown from 50 to 350. The object of the association is to promote the interests of the commercial, industrial, technical, civic, municipal and legislative reference libraries, the special departments of public libraries, universities, welfare associations and business organizations.

The Art Metal Construction Company, Jamestown, N. Y., is furnishing metal equipment for the library of the Scottish Rite Temple, now being built in Washington, D. C. This building will have a library containing more than 100,000 volumes, and considerable attention for its preservation has been given in planning the details of the room in which the books are to be stored. The wall, double-faced stacks and other equipment are to be made of the Art Metal Company's material so that it will be absolutely fire-resisting.

The Lukens Iron & Steel Company raised on Tuesday, June 2, the large 20 x 10-ft. flag presented to the company last September by the Veterans' Association of the Pennsylvania Railroad. The flag was raised on a diamond steel pole on the lawn surrounding the main office building at Coatesville, Pa. It was given as a token of appreciation of the entertainment furnished the Veterans' Association last year at its annual meeting.

Trade Publications

Wagon Loaders.—Link-Belt Company, Chicago, Ill. Book No. 210. Relates to a portable wagon and truck loader for handling coal, coke, stone, sand and similar loose materials from storage. An index and specification sheet of the various loaders is given, followed by a number of engravings showing the development of these devices. The different types of loaders are illustrated and described, a pair of facing pages, as a rule, being given to each type. A number of engravings showing the loaders in use are included, together with testimonial letters and a partial list of users.

Leather Belting.—Charles A. Schieren Company, 37 Ferry street, New York City. Pamphlet entitled "Experience." Relates to the service performed by some Duxbak belts in various plants. The pamphlet consists almost entirely of illustrations of the belting with brief data on the principal points of the installations.

Ore Milling, Cyaniding and Smelting Machinery.—Kennedy-Stroh Corporation, 120 Broadway, New York City. Catalogue section B. Deals with a line of crushing, mining and smelting machinery. The various machines are illustrated and described briefly with numerous line drawings of the several parts.

Vertical Engines.—B. F. Sturtevant Company, Hyde Park, Boston, Mass. Bulletin No. 218. Treats of a line of vertical engines which are built in two general types, one with gravity sight feed lubrication and the other with automatic force feed system. Both throttling and automatic types are built, and the line is designed for direct or belt connection to fans and direct connection to centrifugal pumps and generators or for general service where either variable or constant speed is required. The construction of the engine is gone into at some length, the text being supplemented by numerous engravings of the various parts. Line drawings showing the oiling systems of the two engines are included, together with a table of dimensions and a list of repair parts.

Nut Tapping Machine.—National Machinery Company, Tiffin, Ohio. Tapper talk No. 2. Devoted to the bent tap feature of the automatic nut tapping machine which was illustrated in *The Iron Age*, January 28, 1915. The special advantages claimed for this construction are long service and lessened tap breakage and a consequent reduction in the cost of nut making.

Valves, Hydrants, etc.—Kennedy Valve Mfg. Company, Elmira, N. Y. Catalogue and price list. Size, 6 x 9 in.; pages, 123. Illustrates and gives description and prices on an extensive line of valves, hydrants, etc. It is divided into seven parts. Section A takes up types and details of gate valves; section B, bronze gate valves; section C, iron gate valves and indicator devices for automatic sprinkler systems; section D, renewable disk globe, angle, radiator, swing check, back water and sewer gas valves; section E, fire hydrants, floor stands and valve boxes; section F, price list of repair parts and tables of pressures and areas of circles; and section G, telegraph code.

Rivets.—W. H. Nelson & Son, Taunton, Mass. Folder. Lists a line of copper brake band rivets which are made in six different sizes and various lengths. An engraving showing the comparative sizes of the different rivets is included. Mention is made of a line of iron, brass, copper and German silver rivets and spring cotters.

Crucible Steel.—Braeburn Steel Company, Braeburn, Pa. Booklet. After a brief account of the organization of the company from the formation of a partnership organized some 40 years ago to the present time, the labels of the various brands of steel are reproduced in colors with brief statements of the purposes for which they are to be used. The brands include six grades of crucible cast steel as well as the Gyro and Wesco brands, an alloy steel for hot dies and high-speed self-hardening steels. The various classifications of tool steel are given together with the extras charged for cutting lengths, etc. Tables of weights, decimal equivalents and differences between wire gauges are presented together with information on heats and colors for tempering tool steels and the melting points of metals. Instructions for working tool steels are included.

Metal Working Machinery.—Royersford Foundry & Machine Company, Inc., 52 North Fifth street, Philadelphia, Pa., three folders and catalogue No. 11. The folders deal with a line of metal working machinery which includes sensitive drilling and grinding machines, polishing, grinding and buffing wheel stands and foot presses and tumbling barrels. All of these are illustrated and brief descriptions and specification tables are included. The catalogue gives general description and specifications for a line of shafting hangers of the ceiling and bracket types, pillow blocks, etc. These hangers are furnished with either roller or plain bearings and an illustration of the roller bearing is presented together with a brief statement of its advantages. Lists of the various sizes of hangers that can be supplied are included together with tables of dimensions for the pillow blocks. Mention is also made of a lubricant for the bearings and the gun with which it is applied.

Can Making Machinery.—Torris Wold & Co., 218 North Jefferson street, Chicago, Ill. Collection of loose leaf circulars. Illustrate and describe a line of can making machinery including slitting, seaming, drying, testing, heading and crimping machines, as well as presses for stamping the ends of the cans and for horning and wiring. As a rule a separate circular is given to each machine with an illustration, brief description and condensed table of specifications. An engraving of an automatic can plant in which the tin is carried automatically from one machine to another until the can is completed is presented. Mention is also made of other machinery such as squaring shears and forming rolls, countershafts, dies, blowers, soldering pots, etc.

Drop Forgings.—Anderson Forge & Machine company, Detroit, Mich. Catalogue No. 20. Devoted to a line of drop forgings that includes rod and yoke ends, crankshafts, camshafts, axles, etc. There is practically no text in the catalogue, the products being shown by drawings on which the principal dimensions are marked. A brief description of the plant is included, together with an alphabetical index of the forgings shown.

Steam Shovels.—Vulcan Iron Works Company, Toledo, Ohio. Two pamphlets. Illustrated and descriptive matter in both explain the construction and operation of a line of steam shovels for steam, electric and gasoline drive. A brief description of the general construction of the shovel is given, followed by engravings of the various sizes with tables of specifications.

Metal Working Machinery.—Standard Mfg. Company, Bridgeport, Conn. Twelve bulletins. Illustrations and descriptive matter in the several bulletins explain the operation of a line of metal working machinery which includes gear, rack and worm cutting, drilling, riveting and automatic milling machines and a combination cutter and tool grinding machine, a separate bulletin being devoted to each particular tool. Illustrations of the machines are given together with general descriptions and brief specification tables.

Castings.—Nortmann-Duffke Foundry Company, Layton Park Station, Milwaukee, Wis. Folder. Mentions a line of general gray-iron castings and perforated metal. The castings shown include floor plates, grate bars, washers, vault and coal hole covers, drains, etc. All of these are illustrated and engravings showing some of the forms of perforated metal that can be supplied are included.

Gas and Oil Furnaces.—Chicago Flexible Shaft Company, La Salle and Ontario streets, Chicago, Ill. Catalogue No. 56. Size, 6 x 9 in., pages, 65. Describes and illustrates the Stewart gas and oil furnaces for heat treating metals. The furnaces are adapted for burning all of the common kinds of gas, crude oil or kerosene, and illustrated descriptions are presented of a number of the types. Practical rules and data concerning the melting, hardening and tempering of steel and the relation of furnace design to the results that can be secured are included in the text.

Grinding Machines and Wheels.—Vitrified Wheel Company, Westfield, Mass. Circular and catalogue No. 7. The former lists a line of pedestal grinding machines that are made with wheels at both ends of the spindle as well as a single-wheel bench machine. In connection with the illustrations of the different machines, tables of specifications are given, there being practically no text in the circular. The catalogue gives general description and specifications for a line of corundum, emery, elastic and silicate wheels, together with suggestions for ordering and using. A diagram showing the shapes of wheel faces in most common use is given, together with drawings of the various wheels that can be supplied for different makes of grinding machines. Lists of cup wheels and cylinders regularly carried in stock are included and mention is made of oil stones, emery and corundum bricks and emery wheel dressers.

Hoisting and Sheet Metal Working Machinery.—E. R. Klemm, 1447 West Austin avenue, Chicago, Ill. Catalogue. Illustrates and describes a line of hoisting machinery which includes windlasses and crabs of various types, punching and shearing machines, bending rolls and a tilting metal band saw. Reliance is placed upon engravings to describe the various machines in the catalogue, there being practically no text. An illustrated description of the tilting metal band saw which is made in two sizes having a capacity for 6 and 12-in. round stock respectively appeared in *The Iron Age*, February 24, 1910.

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